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NATIONAL DAM INSPECTION PROGRAM. LAKE-IN-THE-CLOUDS DAM. (NDI I--ETC(U)
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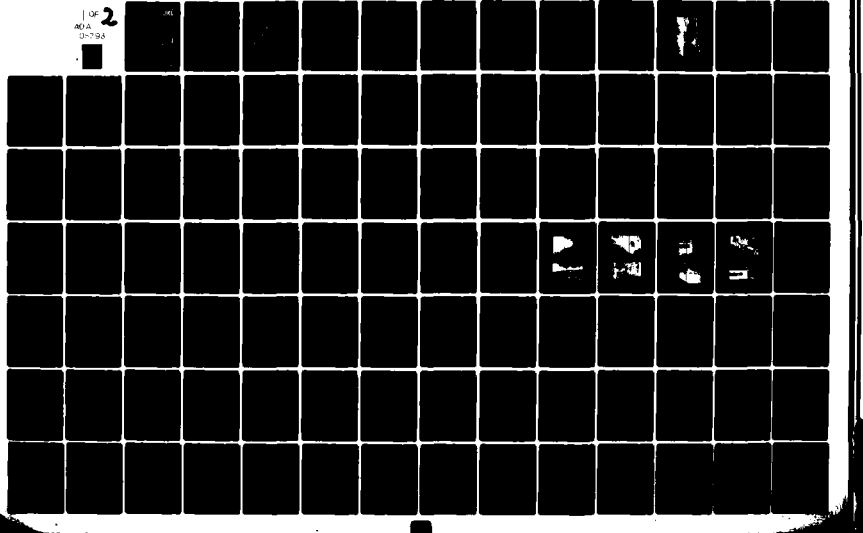

DELAWARE RIVER BASIN
LEAVITT BRANCH OF BRODHEAD CREEK, PIKE COUNTY

LEVEL II

PENNSYLVANIA

LAKE-IN-THE-CLOUDS DAM

NDI ID NO. PA-00741
DER ID NO. 52-125

CHAR-MART, INC.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Prepared by
GANNETT FLEMING CORDDRY AND CARPENTER, INC.
Consulting Engineers
Harrisburg, Pennsylvania 17105

For
DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

JUNE 1980

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
DACW31-80-C-0017

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LEAVITT BRANCH OF BRODHEAD CREEK, PIKE COUNTY

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

DELAWARE RIVER BASIN

LEAVITT BRANCH OF BRODHEAD CREEK, PIKE COUNTY

PENNSYLVANIA

LAKE-IN-THE-CLOUDS DAM

NDI ID No. PA-00741
DER ID No. 52-125

CHAR-MART, INC.

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

JUNE 1980

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PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION

AND

RECOMMENDED ACTION

Name of Dam:	Lake-In-The-Clouds Dam NDI ID No. PA-00741 DER ID No. 52-125
Size:	Small (14 feet high; 468 acre-ft)
Hazard Classification:	High
Owner:	Char-Mart, Inc. Charles B. Ford, President Canadensis, Pennsylvania 18325
State Located:	Pennsylvania
County Located:	Pike
Stream:	Leavitt Branch of Brodhead Creek
Date of Inspection:	15 April 1980

Based on criteria established for these studies, Lake-In-The-Clouds Dam is judged to be unsafe, nonemergency, because the spillway capacity is seriously inadequate. The recommended Spillway Design Flood (SDF) for the size and hazard classification of the dam varies between 1/2 the Probable Maximum Flood (PMF) and the PMF. Based on the criteria and the downstream conditions, the selected SDF is the PMF. Based on existing conditions, with the embankment above its design elevation, the spillway will pass about 35 percent of the PMF before overtopping of the dam occurs. Failure of the dam would cause the probable overtopping and failure of a high hazard dam that is downstream.

As a whole, the dam is judged to be in fair condition. No significant stability problems were observed at the embankment. The ability of the emergency drawdown facility to function is uncertain because it has not been operated recently. Maintenance at the dam is inadequate.

The following studies and remedial measures are recommended to be undertaken by the Owner, in approximate order of priority, immediately:

(1) Cut the top stoplog to be flush with the spillway weir crest.

(2) Perform additional studies to more accurately ascertain the spillway capacity required for Lake-In-The-Clouds Dam as well as the nature and extent of measures required to provide adequate spillway capacity. Take appropriate action as required.

(3) Provide whatever measures are necessary to make the outlet works operational. Once operational, it should be maintained and operated on a regular basis.

(4) Remove trees and brush growing on or near the embankment.

(5) Design and construct repairs for the spalled concrete at the spillway approach walls and outlet works intake structure.

(6) Design and construct erosion protection for the upstream slope of the embankment.

(7) As part of the maintenance program recommended below, fill burrowing animal holes, cut brush on the upstream slope, and prevent unauthorized changes at the embankment.

All investigations, studies, designs, and inspection of construction should be performed by a professional engineer experienced in the design and construction of dams. Tree removal should also be guided by a professional engineer.

In addition, the Owner should institute the following operational and maintenance procedures:

(1) Develop a detailed emergency operation and warning system for Lake-In-The-Clouds Dam.

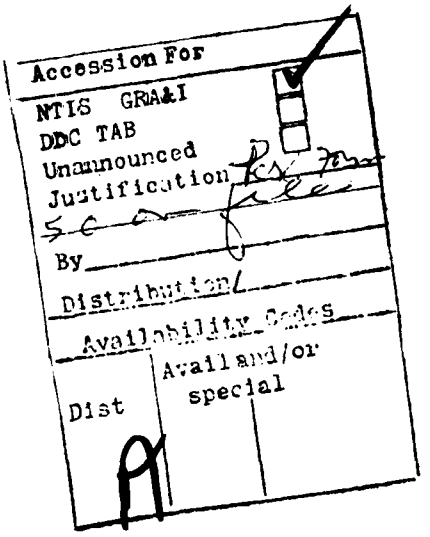
(2) During periods of unusually heavy rains, provide round-the-clock surveillance of Lake-In-The-Clouds Dam. Have sufficient personnel available to clear any debris that might collect at the spillway bridge.

(3) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system.

(4) Institute an inspection program at the dam such that the dam is inspected frequently. As presently required by the Commonwealth, the inspection program should include a formal annual inspection by a professional engineer experienced in the design and construction of dams. Utilize the inspection results to determine if remedial measures are necessary.

(5) Institute a maintenance program such that all features of the dam are properly maintained.

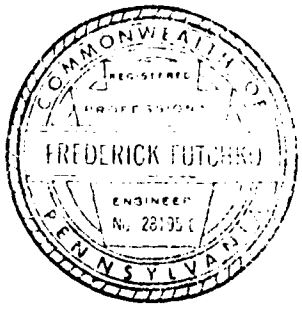
In addition, it is recommended that the Commonwealth require the Owner of the unnamed dam, which is upstream of Lake-In-The-Clouds Dam, to provide an adequate spillway capacity for the unnamed dam.



LAKE-IN-THE-CLOUDS DAM

Submitted by:

GANNETT FLEMING CORDDRY
AND CARPENTER, INC.



FREDERICK FUTCHKO
Project Manager, Dam Section

Date: 27 June 1980

Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date: 14 July 1980

LAKE-IN-THE-CLOUDS DAM

Overview

DELAWARE RIVER BASIN

LEAVITT BRANCH OF BRODHEAD CREEK, PIKE COUNTY

PENNSYLVANIA

LAKE-IN-THE-CLOUDS DAM

NDI ID No. PA-00741
DER ID No. 52-125

CHAR-MART, INC.

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

JUNE 1980

SECTION 1

PROJECT INFORMATION

1.1 General.

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Lake-In-The-Clouds Dam is a homogeneous earthfill embankment with a concrete cutoff wall. The embankment is 510 feet long and 14 feet high. The cutoff wall is founded in a cutoff trench and rises to about 1 foot above the natural ground surface at the site.

The spillway is located near the right abutment of the dam. It is a concrete gravity weir with a rounded crest. Its crest is 32 feet long and 4.0 feet below the design top elevation of the dam. A timber plank bridge supported by steel I-beams spans the spillway. A stoplog slot with wooden stoplogs is provided in the middle of the weir.

The outlet works is located in the center of the embankment. It consists of a concrete intake structure with a 24-inch sluice gate, a 24-inch diameter cast-iron pipe, and an endwall. The various features of the dam are shown on the Photographs in Appendix C and on the Plates in Appendix E. A description of the geology is included in Appendix F.

b. Location. Lake-In-The-Clouds Dam is located on the Leavitt Branch of Brodhead Creek in Green Township, Pike County, Pennsylvania, approximately 4 miles north of Canadensis. Lake-In-The-Clouds Dam is shown on USGS Quadrangle, Buck Hill Falls, Pennsylvania, at latitude N 41° 14' 45" and longitude W 75° 16' 05". A location map is shown on Plate E-1.

c. Size Classification. Small (14 feet high, 468 acre-feet).

d. Hazard Classification. High hazard. Downstream conditions indicate that a high hazard classification is warranted for Lake-In-The-Clouds Dam (Paragraphs 3.1e and 5.1c (5)).

e. Ownership. Char-Mart, Inc., Charles B. Ford, President, Canadensis, Pennsylvania 18325.

f. Purpose of Dam. Recreation.

g. Design and Construction History. Lake-In-The-Clouds Dam was originally designed by the Lake-In-The-Clouds Club in 1950. The Commonwealth reviewed the plans and made many comments concerning them. In response, the club revised the drawings in the same year, but the Commonwealth still had objections. In early 1951, the club submitted yet another set of plans to incorporate the comments. A permit for construction was issued in March 1951. The club then decided to change the design of the dam and retained Edward C. Hess, engineer of Stroudsburg, Pennsylvania.

Mr. Hess revised much of the plans and submitted them to the Commonwealth in August 1951. The revisions were reviewed by the Commonwealth and approved in September 1951. Construction started in the late summer of 1952. The contractor was J. J. Boehm. In September 1952, a revised plan was submitted to allow for a desired 2 foot increase in the height of the dam. The Commonwealth approved this in October 1952. The dam was completed in November 1952. The bridge across the spillway was constructed at an unknown date. The dam has changed ownership several times. The present Owner acquired the dam in 1974.

h. Normal Operational Procedure. The pool is maintained at the spillway crest level with excess inflow discharging over the spillway. The emergency drawdown facilities are not normally used. Spillway discharge flows downstream in the Leavitt Branch of Brodhead Creek.

1.3 Pertinent Data.

a.	Drainage Area. (square miles)	2.1
b.	Discharge at Damsite. (cfs.)	
	Maximum known flood at damsite	Unknown
	Outlet works at maximum pool elevation	50
	Spillway capacity	
	Design conditions	870
	Existing conditions	1,039
c.	Elevation. (feet above msl.)	
	Top of dam	
	Design conditions	1834.0
	Existing conditions	1834.5
	Maximum pool	
	Design conditions	1834.0
	Existing conditions	1834.5
	Normal pool (spillway crest)	1830.0
	Upstream invert outlet works	1820.5
	Downstream invert outlet works	1819.5
	Streambed at toe of dam	1820.2
d.	Reservoir Length. (miles)	
	Normal pool	0.64
	Maximum pool (design)	0.70

e.	Storage. (acre-feet)	
	Normal pool	228
	Maximum pool (design)	434
	Maximum pool (existing)	468
f.	Reservoir Surface. (acres)	
	Normal pool	44.3
	Maximum pool (design)	65.3
	Maximum pool (existing)	71.7
g.	Dam.	
	Type	Homogeneous earthfill with concrete cutoff wall.
	Length (feet)	510
	Height (feet)	14
	Topwidth (feet)	
	Design	18
	Existing	14
	Sides Slopes	
	Upstream	
	Design	1V on 2H
	Existing	1V on 2.9H
	Downstream	
	Design	1V on 2H
	Existing	1V on 2.6H
	Zoning	Cutoff wall.
	Cut-off	Cutoff wall founded in cutoff trench.
	Grout Curtain	None.
h.	Diversion and Regulating Tunnel.	None.
i.	Spillway.	
	Type	Broad-crested concrete gravity weir with rounded crest.

i.	Spillway. (cont'd.) Length of Weir (feet)	32.0
	Crest Elevation	1830.0
	Upstream Channel	Reservoir.
	Downstream Channel	Grouted stone apron.
j.	Regulating Outlets. Type	One 24-inch dia. CMP encased in concrete.
	Length (feet)	55
	Closure	24-inch sluice gate in intake structure.
	Access	By boat to intake structure.

SECTION 2

ENGINEERING DATA

2.1 Design.

a. Data Available. The only design data available for the dam as constructed is one design drawing. It is shown on Plate E-2 in Appendix E. Specifications are available, but they are undated; it is uncertain whether or not they applied to the dam as constructed.

b. Design Features. The project is described in Paragraph 1.2a. The various features of the dam are shown on the Photographs in Appendix C and on the Plates in Appendix E.

c. Design Considerations. There are insufficient data to assess the design.

2.2 Construction.

a. Data Available. The only construction data available for review are reports of inspections by the Commonwealth and an "as-built" drawing. The construction inspection reports indicate that the foundation of the cutoff wall to the right of the spillway is rock and that some of the remainder of the cutoff wall is founded on "heavy clay." The inspectors seemed satisfied that the construction was of good quality. The "as-built" drawing was obtained from the firm (E. C. Hess Associates) that was founded by the design engineer. The drawing is dated 1965 and part of it is shown on Plate E-3. The firm had no information concerning why the drawing was updated 13 years after construction.

b. Construction Considerations. The available data raises no concerns about the construction.

2.3 Operation. There are no formal records of operation. The one post-construction inspection by the Commonwealth in 1965 notes minor maintenance discrepancies.

2.4 Evaluation.

a. Availability. Engineering data were provided by the Bureau of Dams and Waterway Management, Department of Environmental Resources, Commonwealth of Pennsylvania (PennDER). The President of Char-Mart, who presently resides in Florida, provided information via telephone. The design engineer's firm researched their files for information at the request of the inspection team.

b. Adequacy. The type and amount of available design data and other engineering data are limited, and the assessment must be based on the combination of available data, visual inspection, performance history, hydrologic assumptions, and hydraulic assumptions.

c. Validity. There is no reason to question the validity of the available data.

SECTION 3

VISUAL INSPECTION

3.1 Findings.

a. General. The overall appearance of the dam is fair. Deficiencies were observed as noted below. A sketch of the dam with the locations of deficiencies is presented on Exhibit B-1 in Appendix B. Survey information acquired for this Report is summarized in Appendix B. Datum for the survey was taken at the spillway crest, Elevation 1830.0, as shown on USGS mapping. The Owner uses a different datum. To convert the elevations on the Plates in Appendix E, 1725.0 feet must be added to the elevations on those Plates. On the day of the inspection, the pool was 0.6 foot above the spillway crest level.

b. Embankment. The upstream slope of the embankment is protected by riprap. Low brush is growing through the riprap. At two areas near the outlet works, the upstream slope is eroded. Each area is about 10 feet long (Photograph B). Neither eroded area encroaches significantly upon the top of the dam. The riprap is unevenly graded and poorly placed. On the upstream slope adjacent to the spillway walls, surface runoff swales have been eroded into the slope (Photograph G). The upstream slope at the left end of the embankment has been filled in to create a beach.

A relatively narrow path along the top of the dam is paved with asphalt. The downstream slope has many mature trees growing in it. The slope is very uneven, with many shallow holes, humps, and rills (Photographs C and D). A few burrowing animal holes were observed in the downstream slope. To the right of the spillway, a shallow 2-foot diameter hole has been excavated in the slope. A property owner who lives near the right abutment stated that he had just excavated the hole; he did not divulge the reason.

There was surface runoff flowing along the downstream toe near the left abutment of the dam. No seepage was observed at the dam, although the high tailwater could have obscured seepage near the outlet works outfall.

The survey performed for this inspection reveals that the top of the dam is a minimum of 0.5 foot above its design elevation and that the upstream and downstream slopes are flatter than the design slopes. A profile and section are shown in Appendix B.

c. Appurtenant Structures. The concrete at the outlet works intake structure is badly spalled (Photograph E). The gate stem is badly rusted. No deficiencies were observed at the endwall, which was partially submerged (Photograph F). The streambed at the outfall is above the invert of the outlet works pipe (Photograph F). No representative of the Owner was present during the inspection, so the operation of the outlet works could not be observed. When subsequently contacted, the Owner stated that the outlet works had not been operated since he acquired the dam. He did not know where the operating mechanism was located; it is not on the intake structure (Photograph E).

Stoplogs are provided in the middle of the spillway weir. The upper stoplog protrudes above the top of the weir (Photograph H). The approach walls are badly spalled. The concrete at the upstream end crumbles to the touch. The downstream walls have pattern cracks, leaching and minor peeling and spalling. The spillway bridge, which is fenced shut at the right end, is in good condition.

d. Reservoir Area. The watershed area is mostly wooded, with only an insignificant amount of development around the lake. There are some dams in the watershed, as discussed in Section 5. At the reservoir, the slopes are mild.

e. Downstream Channel. The Leavitt Branch of Brodhead Creek flows from the dam for 3.3 miles to Mountain Lake, which is impounded by Skytop Dam. Within the above reach, the stream passes beneath Pennsylvania Route No. 447 (PA-447) once and PA-390 twice. There is only one building adjacent to the stream in the above reach. It is a small maintenance building just upstream of Mountain Lake. Downstream conditions are shown on Exhibit D-1.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedure. The reservoir is maintained at spillway crest, with excess inflow discharging over the spillway and into the Leavitt Branch. The emergency drawdown facilities are not used.

4.2 Maintenance of Dam. The president of Char-Mart stated that he had been responsible for maintenance until his recent move to Florida. He stated that debris removal and cutting of brush on the dam had been performed each year. He also stated that the local property owners association is responsible for maintenance, although there is no written agreement for this.

4.3 Maintenance of Operating Facilities. The outlet works is not maintained.

4.4 Warning Systems in Effect. The Owner has not developed an emergency operation and warning system for the dam. He stated that Civil Defense or some other state agency had offered to monitor the dam during floods.

4.5 Evaluation of Operational Adequacy. The maintenance of the project is inadequate. Inspections are necessary to detect hazardous conditions at the dam. Since even the name of the flood-monitoring agency is uncertain, it cannot be relied upon to monitor the dam. An emergency operation and warning system is necessary to reduce the risk of dam failure should adverse conditions develop and to prevent loss of life downstream should the dam fail.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 Evaluation of Features.

a. Design Data. No design data are available for the hydraulics of the original structure. The Commonwealth analyzed the design before issuing a permit for construction. Using a discharge coefficient of 3.7 and the design head of 4 feet, they determined the spillway capacity to be 950 cfs. The spillway bridge was not part of the design. The discharge coefficient is slightly high. A coefficient of 3.4 is used in the analysis described hereafter, which also includes the effects of the spillway bridge and the existing top elevation. The records state that the drainage area is 0.9 square mile, which was apparently taken from 15' USGS mapping current in 1950. The 1950 USGS map is available and it was reviewed. It differs greatly from more recent 7.5' USGS mapping, which was used to determine the drainage area of 2.1 square miles that is used in this Report. Even the recent USGS mapping does not accurately reflect conditions that were observed in the field.

b. Experience Data. The Owner stated the highest flow in his recollection was 8 to 10 inches above spillway crest. It is surmised that the flood of record was Tropical Storm Diane in 1955, which was the flood of record for many nearby dams. There is no data to estimate the flow for this storm. There are unconfirmed data that Lake-In-The-Clouds Dam was overtopped during Tropical Storm Diane.

c. Visual Observations.

(1) General. The visual inspection of Lake-In-The-Clouds Dam, which is described in Section 3, resulted in a number of observations relevant to hydrology and hydraulics. These observations are evaluated herein for the various features.

(2) Embankment. The embankment being above its design elevation increases the spillway capacity above its design capacity. In the analysis described hereafter, the dam is rated at its existing elevation. Settlement of the embankment would decrease the existing spillway capacity.

(3) Appurtenant Structures. The sluice gate provides an upstream closure facility. The operational capability of the outlet works is, at best, uncertain because it has not been operated recently and because the operating mechanism is missing. Some emergency drawdown capability is provided by the stoplogs in the spillway weir.

The stoplogs in the spillway weir change the shape of the crest along the length of the notch. They also protrude slightly above the crest. Both these conditions reduce the spillway capacity slightly. However, their effects have not been included in the analysis described hereafter. The effects of possible pressure flow beneath the bridge have been included. The underside of the bridge also has the potential to collect debris; debris would reduce the spillway capacity. Its effects have not been included in determining the spillway capacity.

(4) Reservoir Area. A negligible amount of rural development is in the watershed. There are two dams within the watershed, as noted in Appendix D. One of the dams is Lake Jamie Dam. A Phase I National Dam Inspection Report is concurrently being prepared for Lake Jamie Dam, which is a small size, high hazard dam with an inadequate spillway capacity.

The other dam is located approximately as shown on Plate E-1. It was constructed a few years ago and is the property of the owner of Lake Jamie Dam. It is not shown on recent USGS mapping. The dam is termed the "unnamed dam" for the purposes of this Report. A profile and section of the dam are in Appendix B. It is felt that the indicated location is sufficiently accurate to provide a reasonably accurate drainage area. However, elevation and pool area data were estimated from USGS mapping and observations during the visual inspection. The computed storage could be significantly in error. The effects of both dams have been included in the analysis described hereafter.

Lake Jamie has a natural low area at the upper end of the lake; the low area acts as an auxiliary spillway and it discharges into Spruce Mountain Run. Therefore, not all the runoff into Lake Jamie will flow into Lake-In-The-Clouds. The method used to account for this is described in Appendix D.

(5) Downstream Conditions. No conditions were observed downstream from the dam that would reduce the spillway discharge capacity. Failure of Lake-In-The-Clouds would flood and cause damage to routes PA-463 and PA-330, as well as to a small maintenance building. The possibility for loss of life at these structures is not great. However, the failure could also cause the overtopping and failure of Skytop Dam. A Phase I National Dam Inspection Report has previously been prepared for Skytop Dam, which is a high hazard, intermediate size dam with an inadequate spillway capacity. The effects of Lake-In-The-Clouds were included in the report for Skytop Dam. Differences between that report and this Report are noted in Appendix D. The downstream conditions indicate that a high hazard classification is warranted for Lake-In-The-Clouds Dam.

d. Overtopping Potential.

(1) Spillway Design Flood. According to the criteria established by the Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) for the size (Small) and hazard potential (High) of Lake-In-The-Clouds Dam is between one-half of the Probable Maximum Flood (PMF) and the PMF. Because the SDF for Skytop Dam is the PMF, the PMF is selected as the SDF for Lake-In-The-Clouds Dam. The watershed was modeled with the HEC-1DB computer program. A description of the model is included in Appendix D. The assessment of hydrology and hydraulics is based on existing conditions, and the effects of future development are not considered.

(2) Summary of Results. Pertinent results are tabulated at the end of Appendix D. The analysis reveals that Lake-In-The-Clouds Dam can pass about 35 percent of the PMF before overtopping of the dam occurs. The dam is rated at its existing top elevation. At its design top elevation, the dam could pass about 30 percent of the PMF. As part of this study, it was also found that Lake Jamie Dam and the unnamed dam, located upstream from Lake-In-The-Clouds Dam, will pass 46 percent and slightly less than 20 percent, respectively, of their components of the PMF before being overtopped.

(3) Spillway Adequacy. The criteria used to rate the spillway adequacy of a dam are described in Appendix D. Because Lake-In-The-Clouds Dam cannot pass the 1/2 PMF, a further analysis was performed. In the Phase I Report for Lake Jamie Dam, it is estimated that the dam will not fail during the 1/2 PMF, which is

identical to its component of the 1/2 PMF for the Lake-In-The-Clouds storm. The computed storage of the unnamed dam is sufficiently unreliable that assuming its failure during the 1/2 PMF might give erroneous results. Therefore both dams were assumed to remain intact.

However, Lake-In-The-Clouds Dam was assumed to fail during the 1/2 PMF. The resulting flows were routed downstream to Skytop Dam. No other inflow was assumed to occur at Skytop Dam. For this condition, the failure of Lake-In-The-Clouds would cause Skytop Dam to overtop by 0.2 foot for 0.8 hour.

The Phase I Report for Skytop Dam states that Skytop Dam has previously withstood an overtopping by 1 foot for 24 hours. Therefore, the dam could withstand a 0.2 foot overtopping for 0.8 hour. However, the Phase I Report for Skytop Dam indicates that the uncontrolled drainage area between Skytop Dam and Lake-In-The-Clouds Dam is 4.15 square miles (about 70 percent of the Skytop Dam watershed). It is reasonable to assume that, during the occurrence of the 1/2 PMF over the Lake-In-The-Clouds watershed, a significant amount of runoff would be occurring over the uncontrolled Skytop Dam watershed. It can therefore be assumed that the lake at Skytop Dam (Mountain Lake) would be significantly above normal pool when the failure of Lake-In-The-Clouds Dam occurred. Therefore the failure of Lake-In-The-Clouds would probably cause Skytop Dam to overtop by a much greater amount than the 0.2 foot previously noted and cause its failure. The spillway capacity of Lake-In-The-Clouds is rated as seriously inadequate.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations.

(1) General. The visual inspection of Lake-In-The-Clouds Dam, which is described in Section 3, resulted in a number of observations relevant to structural stability. These observations are evaluated herein for the various features.

(2) Embankment. The growth of the trees on the downstream slope is a hazard to the dam. Root systems of large trees can loosen embankment material, displace slope protection, and create paths along which seepage and piping (internal erosion) might occur. The brush on the upstream slope is minor at present.

The erosion on the upstream slope is also minor at present. It is caused by a combination of surface runoff and wave action. The poorly graded riprap has probably worsened the situation. Further erosion is likely if remedial measures are not taken.

The cause of the lumps, holes, and rills on the downstream slope is not readily apparent. The condition could be caused by erosion before slope protection was established or by removal of tree stumps. As noted in Section 5, the dam may have been overtopped during Tropical Storm Diane in 1955; this would account for the condition of the downstream slope. The condition does not appear to be a stability problem.

The burrowing animal holes can have some of the same effects as tree roots. The problem is minor at present. Unauthorized excavation of the embankment is unwise. The amount removed to date is negligible.

The embankment slopes are flatter than the design. This improves the stability. It is unclear whether the embankment is higher than the design because of overbuild provided during construction or because of fill that may have been added when the strip along the top was paved. The increased height should have no significant effect on the stability of the embankment.

(3) Appurtenant Structures. The spalled concrete on the outlet works intake structure appears to be severe. The structure is in the reservoir and access to it could not be obtained during the visual inspection. The spalling is probably caused by long-term exposure to the weather.

The conditions at the spillway walls downstream of the weir indicate that maintenance repairs may be necessary in the future. They are not sufficiently serious to warrant repairs at present. However, it is uncertain that the upstream end of the approach walls could sustain the imposed loads if any further deterioration were to occur.

b. Design and Construction Data. No stability analyses were available for the embankment or the spillway weir. The spillway weir is sufficiently small that no stability analysis is necessary. It is judged to be stable for the anticipated loading conditions. The available data raise no concerns about the stability of the embankment.

c. Operating Records. There are no formal records of operation. According to available records, no stability problems have occurred over the operational history of the dam.

d. Post-construction Changes. There have been no significant post-construction changes.

e. Seismic Stability. Lake-In-The-Clouds Dam is located in Seismic Zone 1. Earthquake loadings are not considered to be significant for small dams located in Seismic Zone 1 when there are no readily apparent stability problems. Since there are no readily apparent stability problems, the ability of the dam to withstand an earthquake is assumed to be adequate.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND

PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety.

(1) Based on available records, visual inspection, calculations, and past operational performance, Lake-In-The-Clouds Dam is judged to be in fair condition. The recommended SDF for the size and hazard category of the dam varies between the 1/2 PMF and the PMF. Based on the criteria and the downstream conditions, the selected SDF at the dam is the PMF. Based on existing conditions, the spillway will pass about 35 percent of the PMF before overtopping of the dam occurs. If the embankment were at its design elevation, which is lower than the existing top elevation, the spillway would pass about 30 percent of the PMF. Failure of the dam during the 1/2 PMF will cause the overtopping and probable failure of a high hazard dam downstream. For either condition, the spillway capacity is rated as seriously inadequate. Based on criteria established for these studies, the dam is considered to be unsafe, nonemergency, because the spillway capacity is seriously inadequate.

(2) No significant stability problems were observed at the embankment.

(3) The ability of the emergency drawdown facility to function is uncertain.

(4) Maintenance at the dam is inadequate.

(5) A summary of the features and observed deficiencies is listed below:

Feature and Location	Observed Deficiency
Embankment:	Mature trees and burrowing animal holes in downstream slope; poorly placed riprap, minor erosion and brush on upstream slope.

Feature and Location	Observed Deficiency
Spillway:	Stoplogs protruding above crest; badly spalled approach walls; minor deterioration of training wall concrete.
Outlet Works:	Uncertain operation of emergency drawdown facilities; operating mechanism missing; badly spalled concrete on intake structure.

b. Adequacy of Information. The information available is such that an assessment of the condition of the dam can be inferred from the combination of visual inspection, past performance, and computations performed prior to and as part of this study.

c. Urgency. The recommendations in Paragraph 7.2 should be implemented immediately.

d. Necessity for Further Investigations. In order to accomplish some of the remedial measures outlined in Paragraph 7.2, further investigations by the Owner will be required.

7.2 Recommendations and Remedial Measures.

a. The following studies and remedial measures are recommended to be undertaken by the Owner, in approximate order of priority, immediately:

(1) Cut the top stoplog to be flush with the spillway weir crest.

(2) Perform additional studies to more accurately ascertain the spillway capacity required for Lake-In-The-Clouds Dam as well as the nature and extent of measures required to provide adequate spillway capacity. Take appropriate action as required.

(3) Provide whatever measures are necessary to make the outlet works operational. Once operational, it should be maintained and operated on a regular basis.

(4) Remove trees and brush growing on or near the embankment.

(5) Design and construct repairs for the spalled concrete at the spillway approach walls and outlet works intake structure.

(6) Design and construct erosion protection for the upstream slope of the embankment.

(7) As part of the maintenance program recommended below, fill burrowing animal holes, cut brush on the upstream slope, and prevent unauthorized changes at the embankment.

All investigations, studies, designs, and inspection of construction should be performed by a professional engineer experienced in the design and construction of dams. Tree removal should also be guided by a professional engineer.

b. In addition, the Owner should institute the following operational and maintenance procedures:

(1) Develop a detailed emergency operation and warning system for Lake-In-The-Clouds Dam.

(2) During periods of unusually heavy rains, provide round-the-clock surveillance of Lake-In-The-Clouds Dam. Have sufficient personnel available to clear any debris that might collect at the spillway bridge.

(3) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system.

(4) Institute an inspection program at the dam such that the dam is inspected frequently. As presently required by the Commonwealth, the inspection program should include a formal annual inspection by a professional engineer experienced in the design and construction of dams. Utilize the inspection results to determine if remedial measures are necessary.

(5) Institute a maintenance program such that all features of the dam are properly maintained.

c. In addition, it is recommended that the Commonwealth require the owner of the unnamed dam, which is upstream of Lake-In-The-Clouds Dam, to provide an adequate spillway capacity for the unnamed dam.

APPENDIX A

CHECKLIST - ENGINEERING DATA

CHECKLIST

ENGINEERING DATA

DESIGN, CONSTRUCTION, AND OPERATION
PHASE I

NAME OF DAM: LAKE-IN-THE-CLOUDS

NDI ID NO.: PA-00741 DER ID NO.: 52-125

ITEM	REMARKS
AS-BUILT DRAWINGS	See PLATE E-3 DESIGN DRAWING - PLATE E-2
REGIONAL VICINITY MAP	SEE PLATE E-1
CONSTRUCTION HISTORY	BUILT 1952
TYPICAL SECTIONS OF DAM	See PLATE E-2
OUTLETS: Plan Details Constraints Discharge Ratings	See PLATE E-2

ENGINEERING DATA

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	NONE
DESIGN REPORTS	NONE PERMIT APPLICATION REPORTS AVAILABLE
GEOLOGY REPORTS	NONE
DESIGN COMPUTATIONS: Hydrology and Hydraulics (H&H) Dam Stability Seepage Studies	NONE
MATERIALS INVESTIGATIONS: Boring Records Laboratory Field	NONE
POSTCONSTRUCTION SURVEYS OF DAM	NONE

ENGINEERING DATA

ITEM	REMARKS
BORROW SOURCES	DATA NOT AVAILABLE
MONITORING SYSTEMS	NONE
MODIFICATIONS	BRIDGE OVER SPILLWAY ADDED AT UNKNOWN DATE.
HIGH POOL RECORDS	NONE - PROBABLY TROPICAL STORM DIANE IN 1955
POSTCONSTRUCTION ENGINEERING STUDIES AND REPORTS	NONE
PRIOR ACCIDENTS OR FAILURE OF DAM: Description Reports	NONE

ENGINEERING DATA

ITEM	REMARKS
MAINTENANCE AND OPERATION RECORDS	None
SPILLWAY: Plan Sections Details	See Plate E-2
OPERATING EQUIPMENT: Plans Details	See Plate E-2
PREVIOUS INSPECTIONS Dates Deficiencies	1965 - No deficiencies except brush and debris at outlet works channel and in spillway channel.

APPENDIX B

CHECKLIST - VISUAL INSPECTION

CHECKLIST

VISUAL INSPECTION

PHASE I

Name of Dam: LAKE-IN-THE-CLOUDS County: PIKE State: PENNSYLVANIA

NDI ID No.: PA-00741 DER ID No.: 52-125

Type of Dam: EARTHFILL Hazard Category: HIGH

Date(s) Inspection: 15 APRIL 1980 Weather: CLEAR-WINDY Temperature: 45°F

HEAVY RAINS ON THE NIGHT OF 14-15 APRIL

Pool Elevation at Time of Inspection: 1830.6 msl/Tailwater at Time of Inspection: 1821.7 msl

Inspection Personnel:

MR. MCWILLIAMS (LOCAL PROPERTY OWNER WHO STATED THAT HE OWNS THE RIGHT END OF THE DAM)

D. WILSON (GFCC)

D. EBERSOLE (GFCC)

A. WHITMAN (GFCC) Recorder

B-1

EMBANKMENT

Sheet 1 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	NONE	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	NONE	
SLOUGHING OR EROSION: Embankment Slopes Abutment Slopes	TO LEFT OF SPILLWAY, DOWNSTREAM SLOPE VERY UNEVEN WITH FAIRLY DEEP RILLS. EROSION ON UPSTREAM SLOPE NEAR OUTLET WORKS.	SURFACE RUNOFF SWALES AT UPSTREAM SPILLWAY WALLS. A FEW BURROWING ANIMAL HOLES IN DOWNSTREAM SLOPE. A SHALLOW 2' DIA. HOLE HAS BEEN EXCAVATED IN EMB. TO RIGHT OF SPILLWAY.
CREST ALIGNMENT: Vertical Horizontal	HORIZONTAL - NO DEFICIENCIES VERTICAL - SEE SURVEY DATA FOLLOWING INSPECTION FORM	
RIPRAP FAILURES	UPSTREAM SLOPE IS FILLED TO CREATE A BEACH AT LEFT END.	RIPRAP IS UNEVENLY GRADED AND POORLY PLACED. ALSO SEE "EROSION".

EMBANKMENT

Sheet 2 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT WITH: Abutment Spillway Other Features	No deficiencies	
ANY NOTICEABLE SEEPAGE	Flow along toe from surface runoff	
STAFF GAGE AND RECORDER	None	
DRAINS	None	
Vegetation	Low brush on upstream slope. Mature trees on downstream slope.	

OUTLET WORKS

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	24" CORRUGATED METAL PIPE (CMP) ENCASED (SEE PLATE E-2)	
INTAKE STRUCTURE	IN RESERVOIR - ACCESS by INSPECTION TEAM NOT POSSIBLE. Edges BADLY SPALLED.	
OUTLET STRUCTURE	ENDWALL. PIPE AT ENDWALL 1/2 FULL OF SEDIMENT AND debris.	
OUTLET CHANNEL	No deficiencies	
EMERGENCY GATE	STEM RUSTED, No OPERATING MECHANISM VISIBLE.	

UNGATED SPILLWAY

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	GOOD CONDITION FLOW OVER WEIR, DETAILED INSPECTION NOT POSSIBLE	STOPLOGS IN MIDDLE OF WEIR. ROTTEN TIMBER DEBRIS AT WEIR.
APPROACH CHANNEL	SEVERE SPALLING OF APPROACH WALLS.	CONCRETE CRUMBLES TO THE TOUCH.
DISCHARGE CHANNEL	MINOR PEELING AND SPALLING ON WALLS.	CHANNEL CLEAR. PATTERN CRACKS AND LEACHING BENEATH BRIDGE.
BRIDGE AND PIERS	STEEL I BEAMS TIMBER DECK GOOD CONDITION	

INSTRUMENTATION

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	NONE AT SITE	
OBSERVATION WELLS		
WEIRS		
PIEZOMETERS		
OTHER	NONE AT SITE	

DOWNSTREAM CHANNEL

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION: Obstructions Debris Other	CLEAR NEAR DAMSITE.	
SLOPES	MILD TO FAIRLY STEEP.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	See EXHIBIT D-1 2 ROADS AND SKYTOP DAM	No dwellings

RESERVOIR AND WATERSHED

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	GENERALLY MILD	2 DAMS IN WATERSHED SEE APPENDIX D.
SEDIMENTATION	No observed problems	
WATERSHED DESCRIPTION	ALMOST ENTIRELY WOODED, SOME SWAMPS IN WATERSHED	

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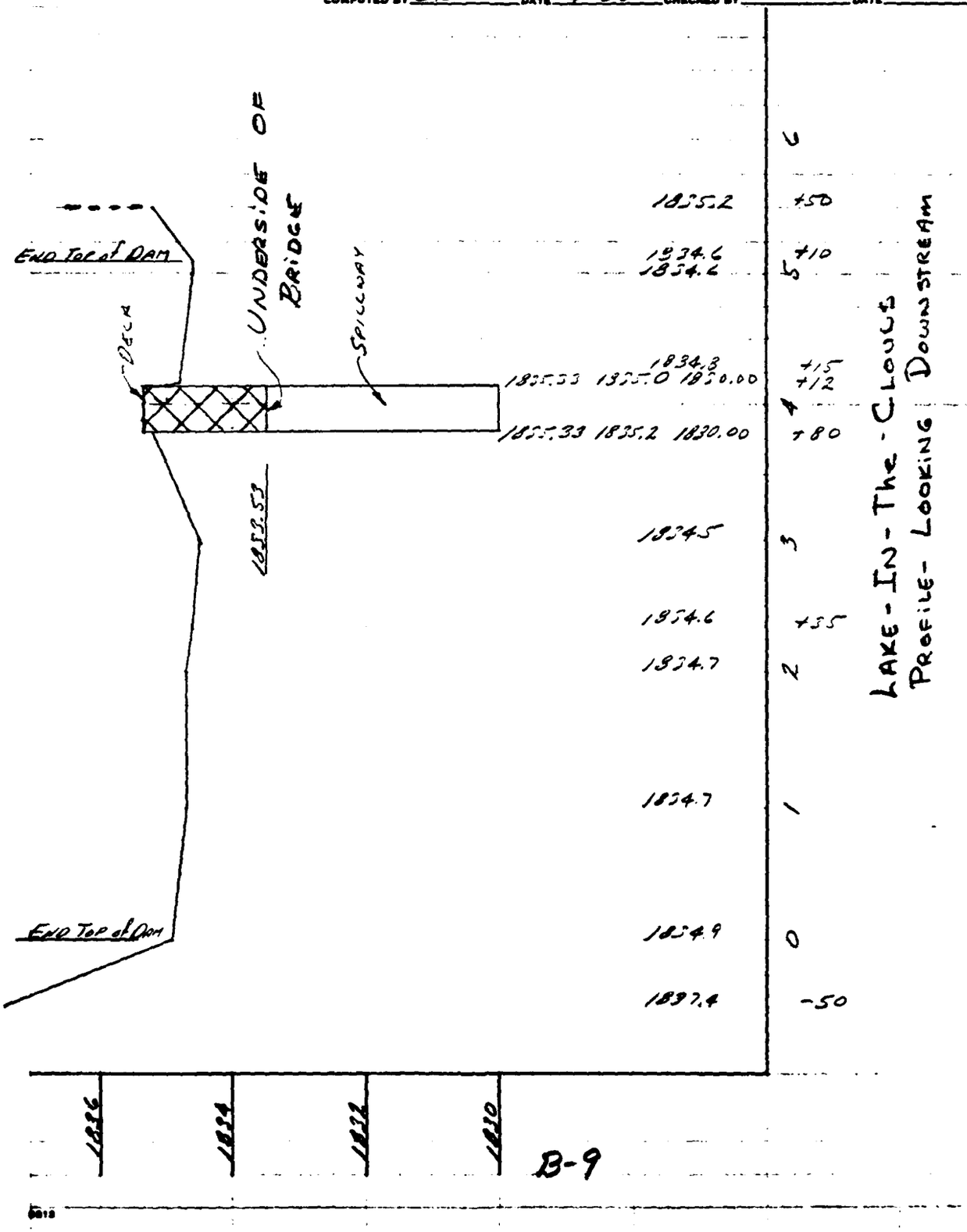
HARRISBURG, PA.

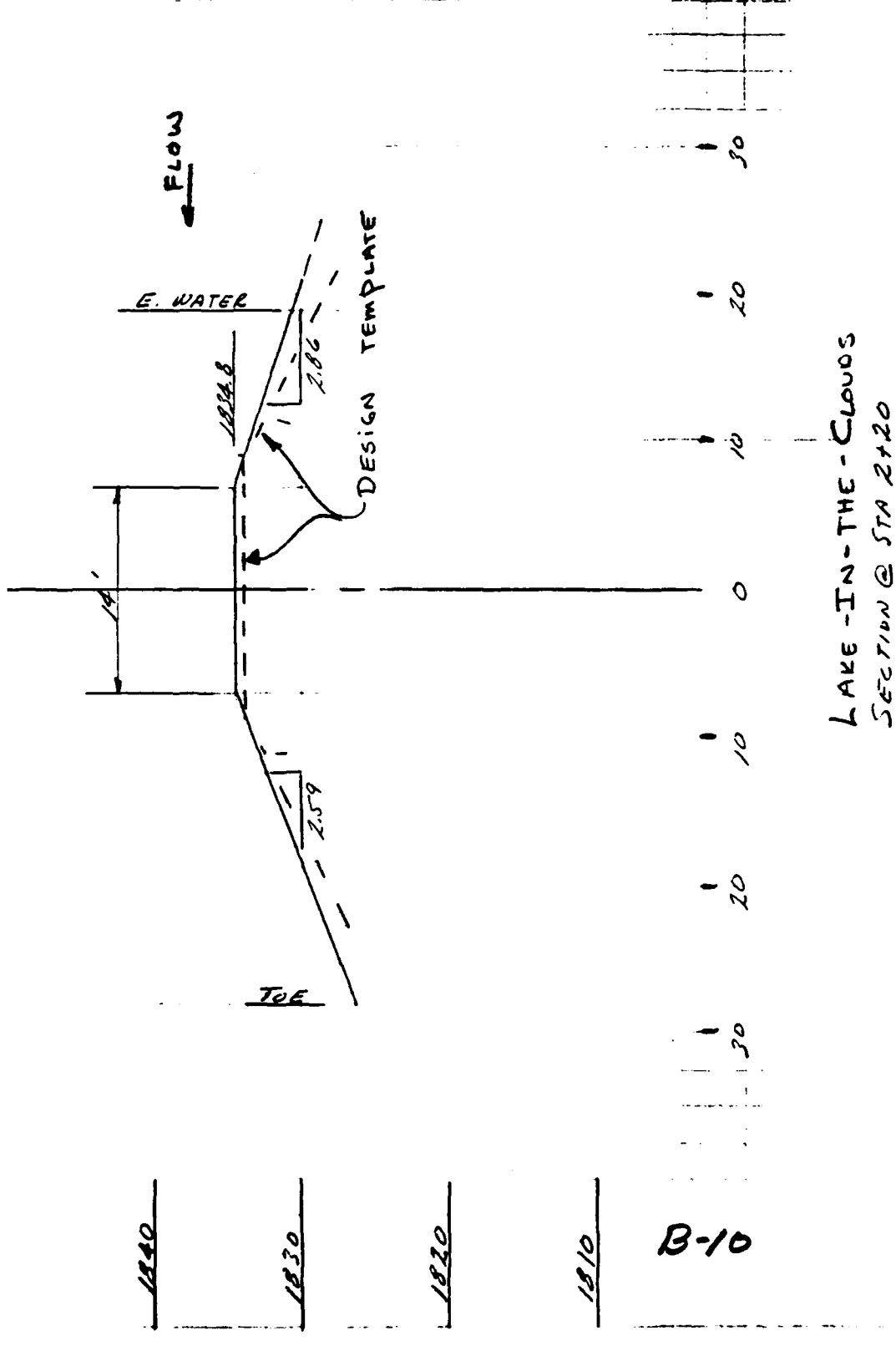
SUBJECT LAKE-IN-THE CLOUDS DAM FILE NO. 8202
PROFILE-TOP of DAM SHEET NO. 1 OF SHEETS
FOR
COMPUTED BY DRE DATE 4-80 CHECKED BY DATE



B-9

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT LAKE-IN-THE CLOUDS DAM FILE NO. 8202
CROSS SECTION of EMBANKMENT SHEET NO. 2 OF ____ SHEETS
FOR ____
COMPUTED BY DRE DATE 4-80 CHECKED BY ____ DATE ____



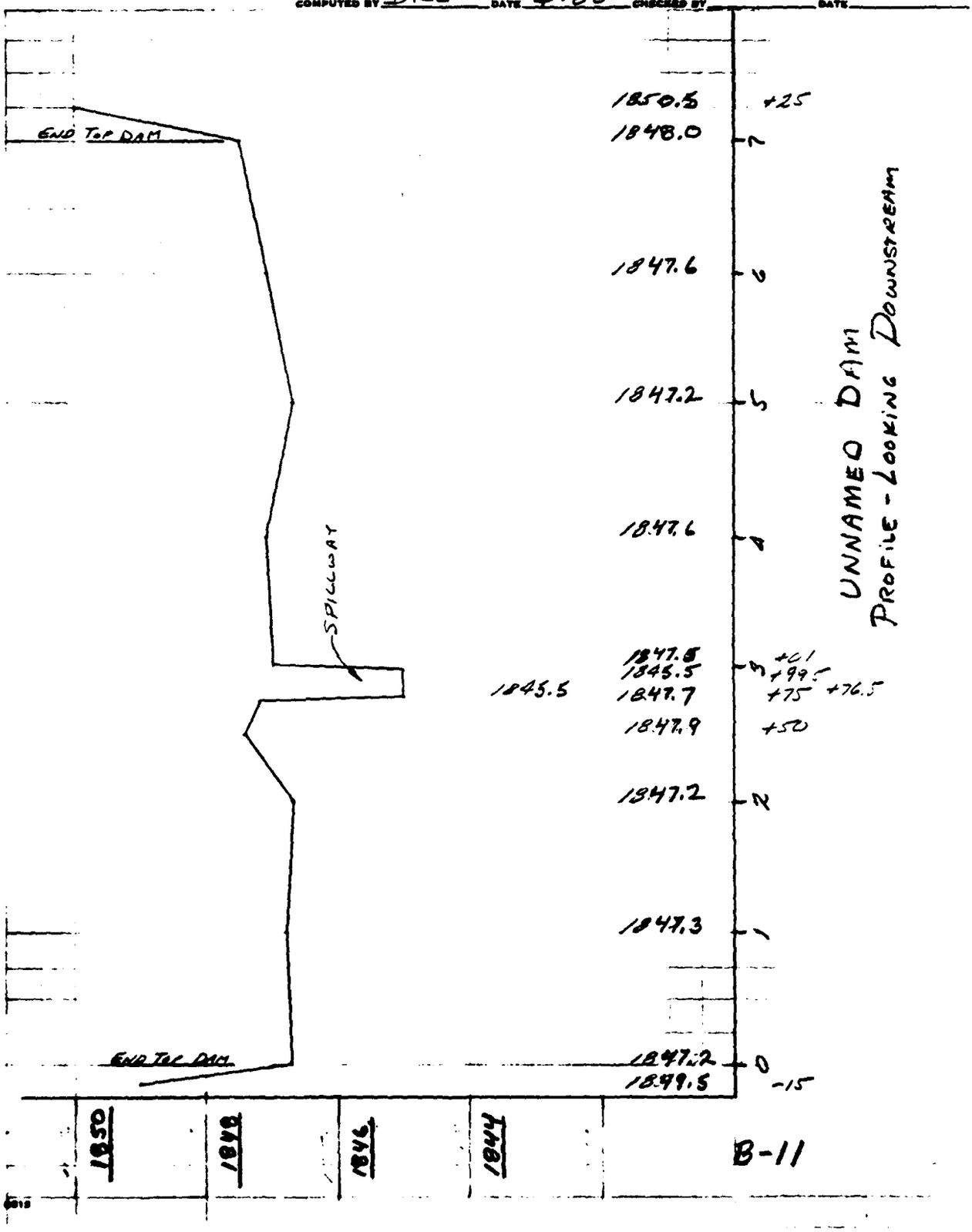
LAKE-IN-THE-CLOUDS
SECTION @ STA 2+20

B-10

0813

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

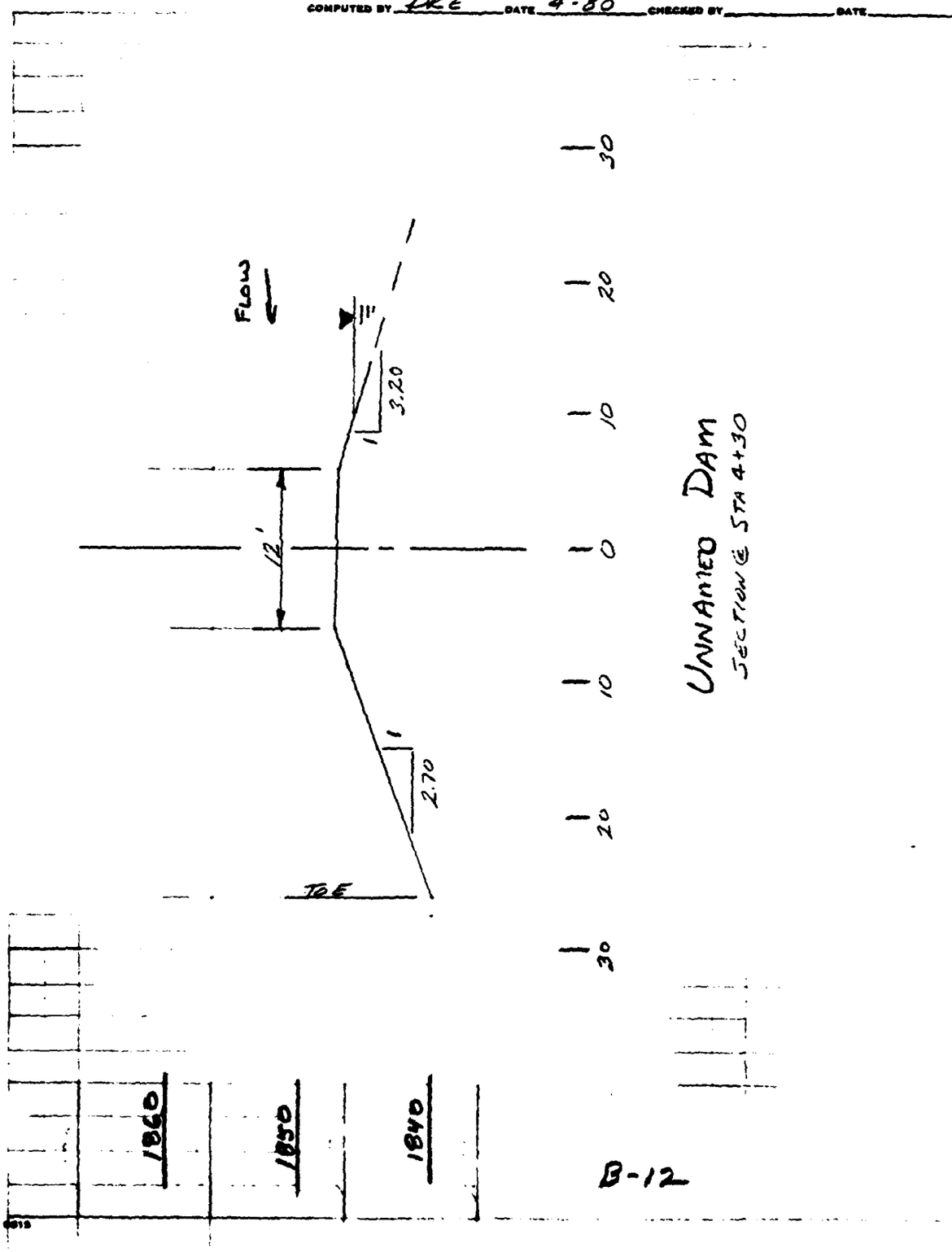
SUBJECT Profile - Top of Dam FILE NO. 8202
SHEET NO. 1 OF ____ SHEETS
FOR
COMPUTED BY DRE DATE 4-80 CHECKED BY ____ DATE ____



B-11

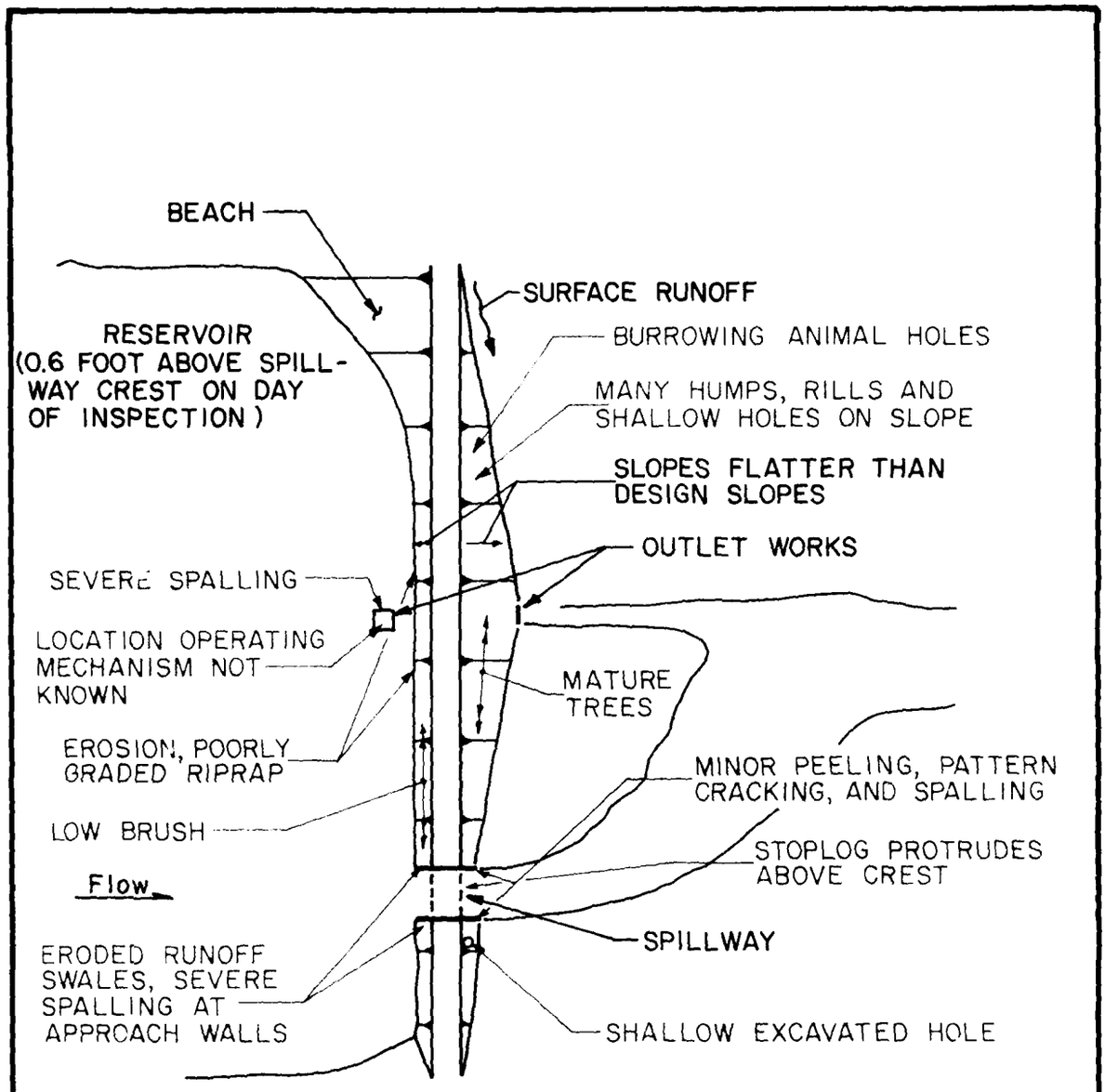
GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT: NEW BALLIET DAM — FILE NO. 8202
CROSS SECTION of EMBANKMENT — SHEET NO. 2 OF ____ SHEETS
FOR:
COMPUTED BY: DKE — DATE: 4-80 — CHECKED BY: ____ — DATE: ____



UNNAMED DAM
SECTION @ STA 4+30

B-12



NOT TO SCALE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE-IN-THE-CLOUDS DAM

CHAR-MART, INC.

RESULTS OF VISUAL INSPECTION

JUNE 1980 EXHIBIT B-1

APPENDIX C

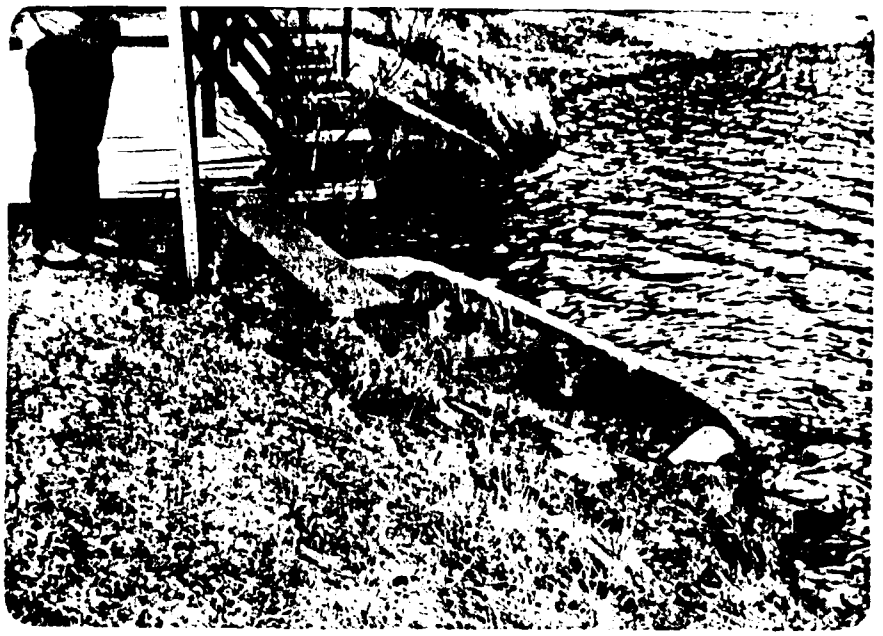
PHOTOGRAPHS

A. Top of Dam

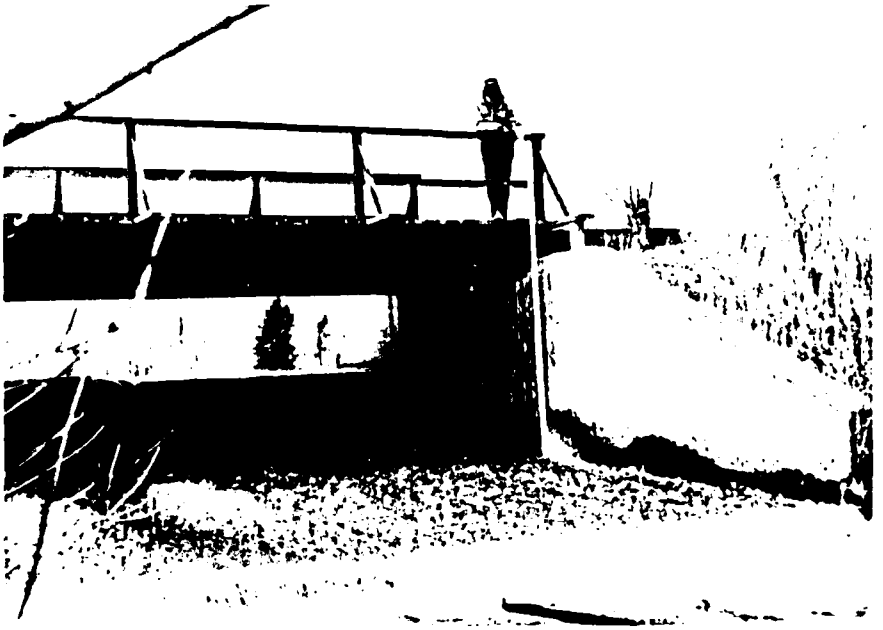
B. Upstream Slope

C. Downstream Slope

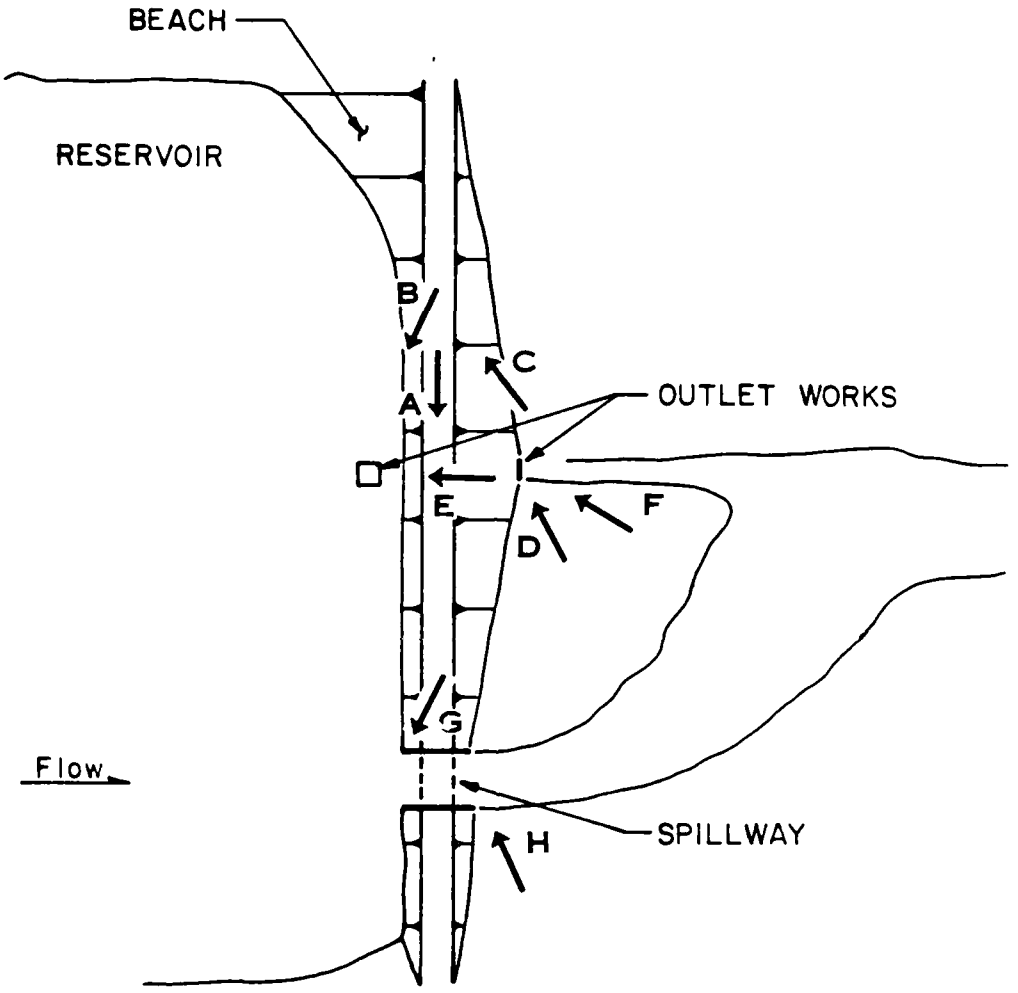
D. Downstream Slope



G. Spillway Approach



H. Spillway



← LOCATION AND ORIENTATION OF CAMERA
A PHOTOGRAPH IDENTIFICATION LETTER

NOT TO SCALE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE-IN-THE-CLOUDS DAM

CHAR-MART, INC.

GUIDE TO LOCATION TO PHOTOGRAPHS

JUNE 1980 EXHIBIT C-1

APPENDIX D

HYDROLOGY AND HYDRAULICS

APPENDIX D

HYDROLOGY AND HYDRAULICS

Spillway Capacity Rating:

In the recommended Guidelines for Safety Inspection of Dams, the Department of the Army, Office of the Chief of Engineers (OCE), established criteria for rating the capacity of spillways. The recommended Spillway Design Flood (SDF) for the size (small, intermediate, or large) and hazard potential (low, significant, or high) classification of a dam is selected in accordance with the criteria. The SDF for those dams in the high hazard category varies between one-half of the Probable Maximum Flood (PMF) and the PMF. If the dam and spillway are not capable of passing the SDF without overtopping failure, the spillway capacity is rated as inadequate. If the dam and spillway are capable of passing one-half of the PMF without overtopping failure, or if the dam is not in the high hazard category, the spillway capacity is not rated as seriously inadequate. A spillway capacity is rated as seriously inadequate if all of the following conditions exist:

(a) There is a high hazard to loss of life from large flows downstream of the dam.

(b) Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure.

(c) The dam and spillway are not capable of passing one-half of the PMF without overtopping failure.

Description of Model:

If the Owner has not developed a PMF for the dam, the watershed is modeled with the HEC-1DB computer program, which was developed by the U.S. Army Corps of Engineers. The HEC-1DB computer program calculates a PMF runoff hydrograph (and percentages thereof) and routes the flows through both reservoirs and stream sections. In addition, it has the capability to simulate an overtopping dam failure. By modifying the rainfall criteria, it is also possible to model the 100-year flood with the program.

APPENDIX D

DELAWARE River Basin
Name of Stream: LEAVITT BRANCH-BRODHEAD CREEK
Name of Dam: LAKE-IN-THE-CLOUDS
NDI ID No.: PA-00741
DER ID No.: 52-125
Latitude: N 41° 14' 45" Longitude: W 75° 16' 05"
Top of Dam Elevation: 1834.5 (EXISTING)
Streambed Elevation: 1820.2 Height of Dam: 14 ft
Reservoir Storage at Top of Dam Elevation: 468 acre-ft
Size Category: SMALL
Hazard Category: HIGH (see Section 5)
Spillway Design Flood: VARIES ½PMF TO PMF
SELECT PMF BECAUSE SDF AT SKYTOP DAM IS PMF.

UPSTREAM DAMS

Name	Distance from Dam (miles)	Height (ft)	Storage at top of Dam Elevation (acre-ft)	Remarks
LAKE JAMIE	0.7	12	276	(1)
UNNAMED	0.6	8	117	(2)

DOWNSTREAM DAMS

SKYTOP	2.1	19	1,021	(3)
SCS PA 463	2.8	88±	11,100	SCS DESIGN DATA

(1) PHASE I REPORT BEING PREPARED CONCURRENTLY, NDI-PA-00778, DER-45-220.
(2) NO DER ID.
(3) PHASE I REPORT AVAILABLE; NDI-PA-00634, DER-45-71.
(4) ALSO 2 SMALL DAMS NOT CONSIDERED SIGNIFICANT TO THE ANALYSIS.

DELAWARE River Basin

Name of Stream: LEAVITT BRANCH, BRODHEAD CREEK

Name of Dam: LAKE-IN-THE-CLOUDS

DETERMINATION OF PMF RAINFALL & UNIT HYDROGRAPH

UNIT HYDROGRAPH DATA:

Sub-area	Drainage Area (square miles)	Cp (1)	Ct (2)	L miles (3)	L_{ca} miles (4)	L' miles (5)	Tp hours (6)	Map Area (7)	Plate (8)
J-1	0.79	0.45	1.23	1.53	.76	N/A	1.29	1	A
N-1	0.30	0.45	1.23	.53	.30	N/A	.71	1	A
L-1	0.96	0.45	1.23	1.29	.42	N/A	1.02	1	A
Total	2.05								

(See Sketch on Sheet D-4)

(1) & (2): Snyder Unit Hydrograph coefficients supplied by Baltimore District, Corps of Engineers on maps and plates referenced in (7) & (8)

The following are measured from the outlet of the subarea:

(3): Length of main watercourse extended to divide

(4): Length of main watercourse to the centroid

The following is measured from the upstream end of the reservoir at normal pool:

(5): Length of main watercourse extended to divide

(6): $Tp=C_t \times (L \times L_{ca})^{0.3}$, except where the centroid of the subarea is located in the reservoir. Then $Tp=C_t \times (L')^{0.6}$

Initial flow is assumed at 1.5 cfs/sq. mile

Computer Data: QRCSN = -0.05 (5% of peak flow)
RTIOR = 2.0

RAINFALL DATA:

PMF Rainfall Index= 22.1 in., 24 hr., 200 sq. mile

	Hydromet. 40 (Susquehanna Basin)	Hydromet. 33 (Other Basins)
Zone:	N/A	1
Geographic Adjustment Factor:	N/A	1.0
Revised Index Rainfall:	N/A	22.1

RAINFALL DISTRIBUTION (percent)

Time	Percent
6 hours	111
12 hours	123
24 hours	133
48 hours	142
72 hours	
96 hours	

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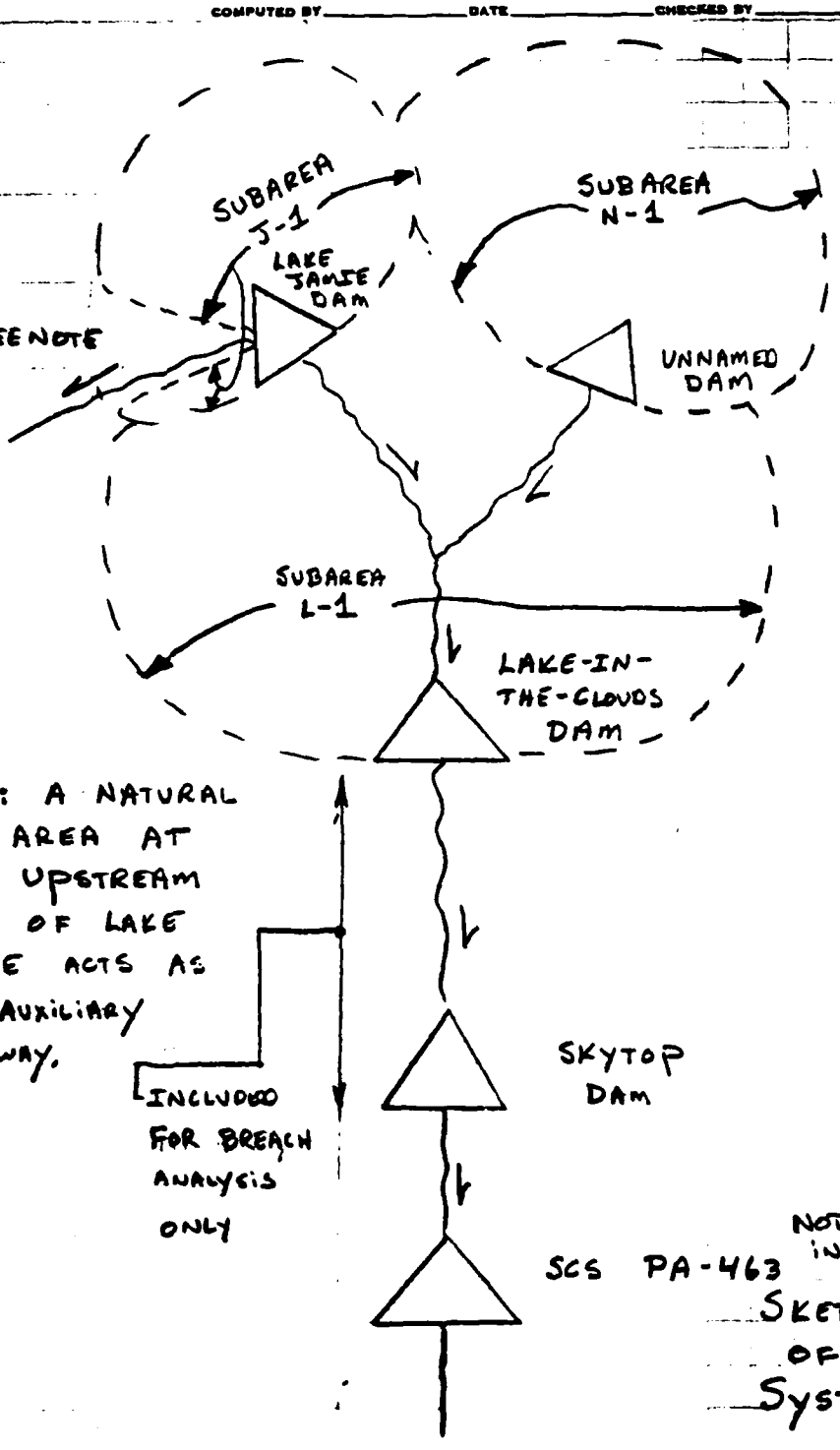
HARRISBURG, PA.

SUBJECT LAKE-IN-THE-CLOUDS FILE NO.
SHEET NO. OF SHEETS
FOR
COMPUTED BY DATE CHECKED BY DATE



NOTE: A NATURAL LOW AREA AT THE UPSTREAM END OF LAKE JAMIE ACTS AS AN AUXILIARY SPILLWAY.

INCLUDED FOR BREACH ANALYSIS ONLY

NOT INCLUDED IN ANALYSIS

SKETCH OF SYSTEM

Data for Dam at Outlet of Subarea J-1 (See sketch on Sheet D-4)

Name of Dam: LAKE JAMIE

STORAGE DATA: FROM PHASE I REPORT

Elevation	Area (acres)	Storage million gals	Storage acre-ft	Remarks
1856.1=ELEVO*	0	0	0	NO DESIGN DATA, ELEVO = STREAMBED AT TOE
1865.0=ELEV1	44 =A1		131 =S1	
1868.0	52		276	EXISTING TOP
1869.0	55		330	DESIGN TOP
1880.0**	94			

* ~~ELEVO = ELEV1 - (3S1/A1)~~ $S_1 = (ELEV1 - ELEVO) \times A1/3$

** Planimetered contour at least 10 feet above top of dam

Reservoir Area at Normal Pool is 9 percent of subarea watershed.

BREACH DATA: NOT USED

See Appendix B for sections and existing profile of the dam.

Soil Type from Visual Inspection: _____

Maximum Permissible Velocity (Plate 28, EM 1110-2-1601) _____ fps
(from $Q = CLH^{3/2} = V \cdot A$ and depth = (2/3) x H) & A = L·depth

HMAX = $(4/9\ V^2/C^2)$ = _____ ft., C = ____ Top of Dam El.= ____

HMAX + Top of Dam El. = _____ = FAILEL
(Above is elevation at which failure would start)

Dam Breach Data:

BRWID = _____ ft (width of bottom of breach)
Z = _____ (side slopes of breach)
ELBM = _____ (bottom of breach elevation, minimum of zero storage elevation)
WSEL = _____ (normal pool elevation)
T FAIL= _____ mins = _____ hrs (time for breach to develop)

Data for Dam at Outlet of Subarea J-1

Name of Dam: LAKE JAMIE

USED FOR ANALYSIS

SPILLWAY DATA: FROM PHASE I REPORT

	Existing Conditions	Design Conditions
Top of Dam Elevation	1868.0	1869.0
Spillway Crest Elevation	1865.0	1865.0
Spillway Head Available (ft)	3.0	4.0
Type Spillway	ROUNDED CREST	
"C" Value - Spillway	3.4	3.4
Crest Length - Spillway (ft)	29.6	30.0
Spillway Peak Discharge (cfs)	523	816
Auxiliary Spillway Crest Elev.		
Auxiliary Spill. Head Avail. (ft)		
Type Auxiliary Spillway		
"C" Value - Auxiliary Spill. (ft)		SEE NEXT SHEET
Crest Length - Auxil. Spill. (ft)		
Auxiliary Spillway Peak Discharge (cfs)		
Combined Spillway Discharge (cfs)		

Spillway Rating Curve: See Next Sheet

Elevation	Q Spillway (cfs)	Q Auxiliary Spillway (cfs)	Combined (cfs)
1865.0			0
1865.7			61
1866.3			159
1866.9			300
1867.5			487
1868.1			722
1869.2			1,351
1870.4			2,207
1871.5			3,312

EXISTING CONDITIONS

OUTLET WORKS RATING:

	Outlet 1	Outlet 2	Outlet 3
Invert of Outlet	NOT PERTINENT TO THIS REPORT		
Invert of Inlet			
Type			
Diameter (ft) = D			
Length (ft) = L			
Area (sq. ft) = A			
N			
K Entrance			
K Exit			
K Friction=$29.1N^2L/R^{4/3}$			
Sum of K			
$(1/K)^{0.5} = C$			
Maximum Head (ft) = HM			
$Q = CA\sqrt{2g(HM)}$ (cfs)			
Q Combined (cfs)			

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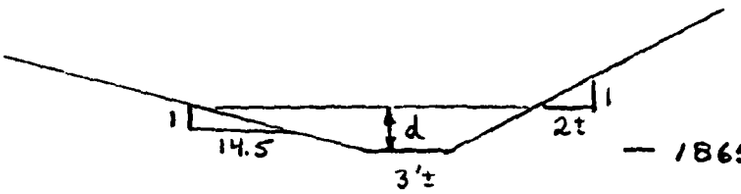
HARRISBURG, PA.

SUBJECT _____ FILE NO. _____
SHEET NO. ____ OF ____ SHEETS
FOR _____
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

LAKE JAMIE
AUXILIARY SPILLWAY
NATURAL OUTLET



FROM FIELD SURVEY FOR LAKE JAMIE DAM PHASE I INSPECTION

USE DISCHARGE COEFFICIENT OF 2.5 BECAUSE OF IRREGULAR APPROACH CONDITIONS

$Q = \frac{2.5}{3.1}\sqrt{\frac{A^3 g}{T}}$ MODIFIED CRITICAL DEPTH

d = depth

A = AREA (FT²) T = TOPWIDTH (FT) Q = FLOW (CFS)

V (VELOCITY - FPS) = Q/A

POOL = $1865.7 + d + V^2/2g$ g = 32.18

$A = d\left(3 + \frac{(14.5+2)}{2} d\right)$ $T = 3 + 16.5d$

ΣQ = Q + MAIN SPILLWAY DISCHARGE

d	A	T	Q	hv	POOL	ΣQ
0	0	3	0	0	1865.7	61
0.5	3.56	11.25	9	.1	1866.3	159
1.0	11.25	19.5	39	.2	1866.9	300
1.5	23.06	27.75	96	.3	1867.5	487
2.0	39.0	36.0	186	.4	1868.1	722
2.5	59.1	44.3	312	.4	1868.6	1,009
3.0	83.3	52.5	480	.5	1869.2	1,351
3.5	111.6	60.8	692	.6	1869.8	1,749
4.0	144	69	952	.7	1870.4	2,207
5.0	221.3	85.5	1,628	.8	1871.5	3,312
15.0	1,901.3	250.5	23,962	2.5	1883.2	31,756

$Q_{MAIN\ SPILLWAY} = 29.6 \times 3.4 \times (POOL - 1865)^{1.5}$

0919

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT _____ FILE NO. _____
SHEET NO. ____ OF ____ SHEETS
FOR _____
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

NOTE ON LAKE JAMIE

THE "AUXILIARY SPILLWAY" DISCHARGES INTO SPRUCE MOUNTAIN RUN, WHICH FLOWS INTO THE MIDDLE BRANCH OF BRODHEAD CREEK. The MIDDLE BRANCH JOINS THE LEAVITT BRANCH NEAR CANADENSIS; IT does NOT FLOW INTO LAKE-IN-THE-CLOUDS.

THEREFORE, THE PMF COMPONENT AT LAKE JAMIE IS TO be DETERMINED AND A TABULATION OF ROUTING POOL ELEVATIONS OBTAINED, USING THE COMBINED SPILLWAY CAPACITY. The POOL ELEVATIONS ARE THEN CONVERTED TO MAIN SPILLWAY discharge,* WHICH REPRESENTS THE FLOW INTO LAKE-IN-THE-CLOUDS.

FURTHER EXPLANATION IS PROVIDED WITH THE COMPUTER PRINTOUT.

* AND FLOW OVER TOP OF EMBANKMENT, IF ANY.

5019

Data for Dam at Outlet of Subarea N-1 (See sketch on Sheet D-4)

Name of Dam: UNNAMED DAM

STORAGE DATA:

Elevation	Area (acres)	Storage million gals	Storage acre-ft	Remarks
1840.0 =ELEVO*	11.8	0	0	SEE NOTE
1845.5 =ELEV1	18.7 =A1		83 =S1	ON FOLLOWING
1847.2	21.2		117	SHEET
1860.0 **	44.5			

* ~~ELEVO = ELEV1 - (3S$_1$/A$_1$)~~ S1 = (ELEV1 - ELEVO) x (A1 + 11.8)/3

** Planimetered contour at least 10 feet above top of dam

Reservoir Area at Normal Pool is 10 percent of subarea watershed.

BREACH DATA:

See Appendix B for sections and existing profile of the dam.

Soil Type from Visual Inspection: _____

Maximum Permissible Velocity (Plate 28, EM 1110-2-1601) _____ fps
(from Q = $CLH^{3/2}$ = V·A and depth = (2/3) x H) & A = L·depth

HMAX = (4/9 V^2/C^2) = _____ ft., C = ____ Top of Dam El.= ____

HMAX + Top of Dam El. = _____ = FAILEL
(Above is elevation at which failure would start)

Dam Breach Data:

BRWID = _____ ft (width of bottom of breach)
Z = _____ (side slopes of breach)
ELBM = _____ (bottom of breach elevation, minimum of zero storage elevation)
WSEL = _____ (normal pool elevation)
T FAIL = _____ mins = _____ hrs (time for breach to develop)

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT _____ FILE NO. _____
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COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

NOTE ON USGS MAPPING AND UNNAMED dAM

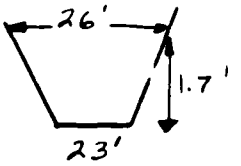
The LOCATION OF THE UNNAMED dAM is SHOWN ON Exhibit D-1 AND PLATE E-1. The LOCATION WAS ESTIMATED FROM VISUAL OBSERVATIONS IN THE FIELD AND IT IS APPROXIMATE. The TOE OF THE dAM WAS ASSUMED AT ELEVATION 1840.0, BASED ON USGS CONTOURS.

AS NOTED ON THE PRECEDING PAGE, THE COMPUTED NORMAL POOL AREA IS 18.7 ACRES. The OWNER OF THE dAM REPORTED THE POOL AREA AS 12 ACRES. FROM VISUAL ESTIMATES OF THE INSPECTION TEAM, THIS APPEARED TO BE LOW.

However, The COMPUTED STORAGE COULD be SIGNIFICANTLY IN ERROR.

Data for Dam at Outlet of Subarea N-1

Name of Dam: UNNAMED



SPILLWAY DATA:	Existing Conditions	Design Conditions
Top of Dam Elevation	1847.2	NOT
Spillway Crest Elevation	1845.5	AVAILABLE
Spillway Head Available (ft)	1.7	
Type Spillway	BROAD CRESTED WEIR	
"C" Value - Spillway	2.7	
Crest Length - Spillway (ft)	25' (SEE SKETCH ABOVE)	
Spillway Peak Discharge (cfs)	150	
Auxiliary Spillway Crest Elev.	N/A	
Auxiliary Spill. Head Avail. (ft)	N/A	
Type Auxiliary Spillway	N/A	
"C" Value - Auxiliary Spill. (ft)	N/A	
Crest Length - Auxil. Spill. (ft)	N/A	
Auxiliary Spillway Peak Discharge (cfs)	N/A	
Combined Spillway Discharge (cfs)	150	

Spillway Rating Curve: $Q = CLH^{3/2} = 2.7 \times 25 \times H^{1.5}$

Elevation	Q Spillway (cfs)	Q Auxiliary Spillway (cfs)	Combined (cfs)

OUTLET WORKS RATING:	Outlet 1	Outlet 2	Outlet 3
Invert of Outlet	18" CMP		
Invert of Inlet	RATING NOT PERTINENT		
Type	TO THIS REPORT		
Diameter (ft) = D			
Length (ft) = L			
Area (sq. ft) = A			
N			
K Entrance			
K Exit			
K Friction=$29.1N^2L/R^{4/3}$			
Sum of K			
$(1/K)^{0.5} = C$			
Maximum Head (ft) = HM			
$Q = CA\sqrt{2g(HM)}$ (cfs)			
Q Combined (cfs)			

Data for Dam at Outlet of Subarea L-1 (See sketch on Sheet D-4)

Name of Dam: LAKE-IN-The-CLOUDS

STORAGE DATA:

PLANIMETERED FROM ORIGINAL OF PLATE E-2

Elevation	Area (acres)	Storage million gals	Storage acre-ft	Remarks
1820.2 =ELEVO*	0	0	0	STREAMBED AT TOE
1824.0 =ELEV1	23.06 =A1		29.8 =S1	
1830.0	44.34		228	
1833.0	53.26		375	
1834.0	65.3		434	DESIGN TOP
1834.5	71.7		468	EXISTING TOP
1840.0**	163			

* ~~ELEVO = ELEV1 - (3S1/A1)~~ $S_1 = (ELEV1 - ELEVO) \times A1/3$

** Planimetered contour at least 10 feet above top of dam

Reservoir Area at Normal Pool is 7 percent of subarea watershed.

BREACH DATA:

See Appendix B for sections and existing profile of the dam.

Soil Type from Visual Inspection: SAND

Maximum Permissible Velocity (Plate 28, EM 1110-2-1601) 2.7 fps
(from $Q = CLH^{3/2} = V \cdot A$ and depth = (2/3) x H) & A = L·depth

HMAX = $(4/9\ V^2/C^2)$ = .34 ft., C = 3.1 Top of Dam El.= 1834.5

HMAX + Top of Dam El. = 1834.8 = FAILEL
(Above is elevation at which failure would start)

Dam Breach Data:

BRWID = 80 ft (width of bottom of breach)
Z = 1 (side slopes of breach)
ELBM = 1820.2 (bottom of breach elevation, minimum of zero storage elevation)
WSEL = 1830.0 (normal pool elevation)
T FAIL = 6 mins = .1 hrs (time for breach to develop)

Data for Dam at Outlet of Subarea L-1

Name of Dam: LAKE-IN-THE-CLOUDS

SPILLWAY DATA:	Existing Conditions	Design Conditions
Top of Dam Elevation	1834.5	1834.0
Spillway Crest Elevation	1830.0	1830.0
Spillway Head Available (ft)	4.5	4.0
Type Spillway	ROUNDED CREST	
"C" Value - Spillway	3.4	3.4
Crest Length - Spillway (ft)	32	32
Spillway Peak Discharge (cfs)	1,039	870
Auxiliary Spillway Crest Elev.		
Auxiliary Spill. Head Avail. (ft)		
Type Auxiliary Spillway		
"C" Value - Auxiliary Spill. (ft)	N/A	N/A
Crest Length - Auxil. Spill. (ft)		
Auxiliary Spillway Peak Discharge (cfs)		
Combined Spillway Discharge (cfs)	1,039	870

Spillway Rating Curve: SEE NEXT SHEET

Elevation	Q Spillway (cfs)	Q Auxiliary Spillway (cfs)	Combined (cfs)
1830.0			0
1830.5			38
1831.0			109
1831.5			200
1832.0			308
1833.0			565
1834.0			870
1834.5			1,039
1835.0			1,134
1840.0			1,807

OUTLET WORKS RATING:	Outlet 1	Outlet 2	Outlet 3
Invert of Outlet	1819.5		
Invert of Inlet	1820.5		
Type	CMP		
Diameter (ft) = D	2		
Length (ft) = L	54.5		
Area (sq. ft) = A	3.14		
N	.024		
K Entrance	0.5		
K Exit	1.0		
K Friction=$29.1N^2L/R^{4/3}$	2.3		
Sum of K	3.8		
$(1/K)^{0.5}$ = C	.51		
Maximum Head (ft) = HM	14		
$Q = CA\sqrt{2g(HM)}$ (cfs)	48.1		
Q Combined (cfs) ≈	50		

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

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SHEET NO. ____ OF ____ SHEETS
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RATING CURVE FOR LAKE-IN-THE CLOUDS SPILLWAY

– 1833.5

1830 ——— ← EXACT CREST NOT DETAILED ON DRAWINGS, USE C = 3.4

L = 32' $Q = C L H^{3/2}$ H = POOL – 1830

FOR PRESSURE FLOW UNDER BRIDGE BEAMS USE $Q = C' A \sqrt{2gH'}$

$A = (1833.5 - 1830) \times 32$

$C' = 0.7$ (ORIFICE)

$H' = \text{POOL} - \frac{(1833.5 + 1830)}{2}$

POOL	$Q = CLH^{3/2}$	$Q = C'A\sqrt{2gH}$	Q CONTROL
1830	0	N/A	0
1830.5	38		38
1831.0	109		109
1831.5	200		200
1832.0	308		308
1832.5	430		430
1833.0	565	N/A	565
1833.5	712	832	712
1834.0	870	943	870
1834.5	1,039	1,043 ← SWITCH CONTROL	1,039
1835.0	1,216	1,134	1,134
1836.6	1,599	1,297	1,297
1840.0	3,440	1,807	1,807

5513

SELECTED COMPUTER OUTPUT

INDEX

* PLAN 1 - NO DAM FAILS
PLAN 2 LAKE-IN-THE-CLOUDS FAILS

C

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  01 APR 80
**********
    1                A1                    NATIONAL DAM INSPECTION PROGRAM
    2                A2                 LEAVITT BRANCH,BRODHEAD CREEK
    3                A3                       LAKE JAMIE DAM
    4                B    220       0       15        0        0        0        0        0       -6        0
    5                B1     5
    6                J      1       6        1
    7                J1   1.0      .7       .6       .5       .4       .3
    8                K      0       1                                          1
    9                K1       INFLOW TO LAKE JAMIE DAM
   10                M      1       1      .79                2.05                                  1
   11                P             22.1     111      123      133      142
   12                T                                                        1      .05                .09
   13                W   1.29     0.45
   14                X   -1.5    -0.05     2.0
   15                K      1       1                                          1        1
   16                K1       ROUTE THROUGH LAKE JAMIE DAM
   17                Y                                1
   18                Y1     1                                                -1865      -1
   19                Y4  1865  1865.7  1866.3  1866.9  1867.5  1868.1  1869.2  1870.4  1871.5
   20                Y5     0      61     159     300     487     722    1351    2207    3312
   21                SA     0      44      94
   22                SE1856.1    1865    1880
   23                SS  1865
   24                SD  1868
   25                SL     1      63     120     140     190
   26                SV  1868  1868.4  1868.7  1868.9  1870
   27                K     99
```

D-16

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS					
				RATIO 1 1.00	RATIO 2 .70	RATIO 3 .60	RATIO 4 .50	RATIO 5 .40	RATIO 6 .30
HYDROGRAPH AT	1	.79	1	2004.	1403.	1203.	1002.	802.	601.
		(2.05)		(56.75)(	39.73)(	34.05)(	28.38)(	22.70)(	17.03)(
ROUTED TO	1	.79	1	1799.	1168.	959.	751.	577.	408.
		(2.05)		(50.95)(	33.07)(	27.15)(	21.28)(	16.33)(	11.56)(

SUMMARY OF DAM SAFETY ANALYSIS

LAKE JAMIE DAM

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1865.00	1865.00	1868.00
STORAGE	131.	131.	275.
OUTFLOW	0.	0.	683.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1869.31	1.31	346.	1799.	5.50	41.75	0.00
.70	1868.73	.73	314.	1168.	4.25	42.25	0.00
.60	1868.47	.47	300.	959.	3.25	42.50	0.00
.50	1868.15	.15	283.	751.	1.75	42.75	0.00
.40	1867.73	0.00	261.	577.	0.00	42.75	0.00
.30	1867.25	0.00	236.	408.	0.00	43.00	0.00

1B

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  01 APR 80
**********
    1              A1                        NATIONAL DAM INSPECTION PROGRAM
    2              A2                           LEAVITT BRANCH,BROOKHEAD CREEK
    3              A3                           LAKE-IN-THE-CLOUDS DAM
    4              B    220       0      15       0       0       0       0       0      -4       0
    5              B1     5
    6              J      1       1       1
    7              J1     1
    8              K      0       2                                               1
    9              K1       INFLOW TO UNNAMED DAM (SUBAREA N-1)
   10              M      1       1      .3              2.05                                    1
   11              P              22.1     111     123     133     142
   12              T                                                       1     .05              .1
   13              M    .71     .45
   14              X   -1.5    -0.05     2.0
   15              K      1       2                                               1
   16              K1       ROUTE THROUGH UNNAMED DAM
   17              Y                               1
   18              Y1     1                                        -1845.5       0
   19              SA   .01    11.9    44.5
   20              SE1839.9    1840    1860
   21              SS1845.5      25     2.7     1.5
   22              SD1847.2
   23              SL     1     260     525     665     700
   24              SV1847.2  1847.3  1847.6  1847.9  1849.5
   25              K      1       3                                               1
   26              K1       ROUTE TO LAKE-IN-THE-CLOUDS (SWAMP)
   27              Y                               1
   28              Y1     1                                          -1
   29              Y6    .1     .06      .1    1840    1860    1950    .005
   30              Y7     0    1900     100    1880     200    1860     280    1840    1250    1840
   31              Y7  1450    1860    1500    1880    1550    1900
   32              K      0       3                                               1
   33              K1       UNCONTROLLED RUNOFF TO LAKE-IN-THE-CLOUDS (SUBAREA L-1)
   34              M      1       1     .96              2.05                                    1
   35              P              22.1     111     123     133     142
   36              T                                                       1     .05              .07
   37              M   1.02     .45
   38              X   -1.5    -0.05     2.0
   39              K      0       3                                       1       1
   40              K1       INFLOW FROM LAKE JAMIE (SUBAREA J-1) (ROUNDED TO NEAREST 10 CFS)
   41              M     -1                .79              2.05                                    1
   42              N
   43              N
   46              N
   45              N
   46              N
   47              N
   48              N                                                               10      10      10      10
   49              N     10      10      20      20      20      20      20      20      20      20
   50              N     20      20      20      20      20      20      20      20      20      20
```

J1 CARD, NUMBER IN FIRST FIELD INDICATES RATIO OF PMF (FOR THIS EXAMPLE 1.0)

(BLANK FIELDS INDICATE 0)

TOTAL OUTFLOW HYDROGRAPH FROM LAKE JAMIE DAM LESS THE DISCHARGE FROM THE LAKE JAMIE "AUXILIARY" SPILLWAY = DISCHARGE TO LAKE-IN-THE-CLOUDS

LZTC PMF 85

D-19

B

51	N	20	20	20	20	20	20	20	20	20	20
52	N	20	20	20	20	20	20	20	20	20	20
53	N	20	20	20	20	20	20	20	20	20	20
54	N	20	20	20	30	30	30	30	30	30	40
55	N	40	40	50	50	50	60	60	60	70	70
56	N	80	80	80	90	90	100	100	110	120	140
57	N	160	190	210	250	280	320	360	400	450	510
58	N	590	720	900	1080	1190	1250	1280	1280	1240	1220
59	N	1150	1100	1040	960	880	810	750	720	630	590
60	N	550	520	500	470	440	440	400	380	360	340
61	N	320	310	300	270	260	250	230	230	210	200
62	N	190	180	170	160	150	150	140	130	130	120
63	N	120	110	110	100	100	90	90	80	80	80
64	K	3	3				1	1			
65	K1	COMBINE INFLOW TO LAKE-IN-THE-CLOUDS									
66	K	1	3								
67	K1	ROUTE THROUGH LAKE-IN-THE-CLOUDS						1			
68	Y				1						
69	Y1	1						-1830	-1		
70	Y4	1830	1830.5	1831.0	1831.5	1832.0	1833.0	1834.0	1834.5	1835.0	1840.0
71	Y5	0	38	109	200	308	565	870	1039	1134	1807
72	SA	.01	23.06	44.34	53.26	163					
73	SE	1820.2	1824	1830	1833	1840					
74	SS	1830									
75	SD	1834.5									
76	SL	1	80	180	460	515	525	560	600		
77	SV	1834.5	1834.6	1834.7	1834.9	1835.2	1835.3	1835.4	1837.4		
78	K	99									

INTO LAKE-IN-THE-CLOUDS.

EXCEPT FOR LINE 7 (J1 CARD) AND LINES 42 TO 63 (N CARDS), INPUT IS IDENTICAL FOR EACH RATIO OF THE PMF.

(BLANK FIELDS INDICATE 0)

42	N										
43	N										
44	N										
45	N										
46	N										
47	N										
48	N							10	10	10	10
49	N	10	10	20	20	20	20	20	20	20	20
50	N	20	20	20	20	20	20	20	20	20	20
51	N	20	20	20	20	20	20	20	20	20	20
52	N	20	20	20	20	20	20	20	20	20	20
53	N	20	20	20	20	20	20	20	20	20	20
54	N	20	20	20	20	30	30	30	30	30	40
55	N	40	40	50	50	50	60	60	60	60	70
56	N	70	70	80	80	80	80	90	90	100	110
57	N	130	160	190	220	260	296	340	400	460	530
58	N	550	620	720	810	890	970	1020	1050	1100	1130
59	N	1130	1110	1070	1060	1000	970	930	890	850	810
60	N	760	710	670	640	610	570	550	510	480	460
61	N	430	410	400	370	340	330	320	300	280	270
62	N	250	240	230	220	210	200	190	180	170	160
63	N	160	150	140	140	130	120	120	110	110	110

.50 PMF

EXTRACTED FROM INPUT LISTING OF ANOTHER COMPUTER RUN - SEE NOTE ON NEXT PAGE.

J1 CARD FIELD 1 = 0.5

(BLANK FIELDS INDICATE 0)

42	N										
43	N										
44	N										
45	N										
46	N										
47	N										
48	N							10	10	10	10
49	N	10	20	20	20	20	20	20	20	20	20
50	N	20	20	20	20	20	20	20	20	20	20
51	N	20	20	20	20	20	20	20	20	20	20
52	N	20	20	20	20	20	20	20	20	20	20
53	N	20	20	20	20	20	20	20	20	20	20
54	N	20	20	30	30	30	30	30	30	40	40
55	N	40	40	50	50	50	60	60	60	70	70
56	N	70	70	80	80	80	85	90	100	100	120
57	N	130	140	170	200	230	270	310	340	390	450
58	N	530	610	700	790	890	940	1000	1070	1080	1120
59	N	1130	1120	1100	1060	1050	1020	960	930	890	930
60	N	800	760	720	670	640	610	590	550	530	490
61	N	470	450	420	400	380	360	340	320	310	300
62	N	280	270	250	240	230	220	210	200	190	180
63	N	170	160	150	150	140	140	140	130	130	120

.40 PMF

EXTRACTED FROM INPUT LISTING OF ANOTHER COMPUTER RUN - SEE NOTE ON NEXT PAGE.

J1 CARD FIELD 1 = 0.4

(BLANK FIELDS INDICATE 0)

42	N							10	10	10	10
43	N							20	20	20	20
44	N							20	20	20	20
45	N										
46	N										
47	N										
48	N										
49	N	10	10	20	20	20	20				
50	N	20	20	20	20	20	20				
51	N	20	20	20	20	20	20	20	20	20	20
52	N	20	20	20	20	20	20	20	20	20	20
53	N	20	20	20	20	20	20	20	20	20	20
54	N	20	20	20	20	30	30	30	30	30	40
55	N	40	40	50	50	50	60	60	60	60	70
56	N	70	70	80	80	80	80	90	90	100	110
57	N	130	140	160	180	200	240	280	320	370	420
58	N	480	570	660	760	830	910	970	1050	1070	1110
59	N	1130	1130	1120	1100	1060	1050	1000	970	910	890
60	N	840	810	780	730	700	660	630	590	550	530
61	N	510	480	460	440	420	400	380	360	340	320
62	N	310	300	280	270	250	240	220	220	210	200
63	N	190	190	180	180	170	160	160	150	150	140

.30 PMF EXTRACTED FROM INPUT LISTING OF ANOTHER COMPUTER RUN - SEE NOTE BELOW

J1 CARD FIELD 1 = 0.3

NOTE: BECAUSE SOME OF THE OUTFLOW FROM LAKE JAMIE DAM DOES NOT FLOW INTO LAKE-IN-THE-CLOUDS, A PERIOD BY PERIOD OUTFLOW HYDROGRAPH, FOR 1.0, 0.5, 0.4, AND 0.3 TIMES THE PMF, WAS OBTAINED FROM LAKE JAMIE DAM. THE OUTFLOW FROM THE "AUXILIARY" SPILLWAY AT LAKE JAMIE DAM WAS THEN SUBTRACTED FROM LAKE JAMIE OUTFLOW HYDROGRAPH. THE ORDINATES THUS OBTAINED WERE DIVIDED BY THE RATIO OF THE PMF AND INPUT AS A "KNOWN" HYDROGRAPH ON N CARDS. WHEN UTILIZED BY THE COMPUTER, THE "KNOWN" HYDROGRAPH IS MULTIPLIED BY THE PMF RATIO ON THE J1 CARD. THIS REQUIRES A DIFFERENT COMPUTER RUN FOR EACH RATIO OF THE PMF.

E.G. TOTAL OUTFLOW FROM LAKE JAMIE DAM FOR 1 TIME INCREMENT (50% PMF) = 751 CFS
LESS OUTFLOW OVER "AUXILIARY" SPILLWAY (OBTAINED FROM POOL ELEVATIONS) = -186 CFS
= 565 CFS

÷ 0.5 (RATIO OF PMF)

TOTAL = 1130 CFS
INPUT ON N CARD

B

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIOS APPLIED TO FLOWS		
				1.00	.50	.40	.30
HYDROGRAPH AT	2	.30	1	1039.	520.	416.	312.
	(	.78)	(	29.43)(	14.71)(	11.77)(	8.83)(
ROUTED TO	2	.30	1	1038.	492.	367.	226.
	(	.78)	(	29.39)(	13.93)(	10.39)(	6.35)(
ROUTED TO	3	.30	1	959.	460.	342.	217.
	(	.78)	(	27.16)(	13.01)(	9.68)(	6.14)(
HYDROGRAPH AT	3	.96	1	2762.	1381.	1105.	829.
	(	2.49)	(	78.22)(	39.11)(	31.29)(	23.47)(
HYDROGRAPH AT	3	.79	1	1280.	565.	452.	339.
	(	2.05)	(	36.25)(	16.00)(	12.80)(	9.60)(
3 COMBINED	3	2.05	1	4677.	2189.	1708.	1197.
	(	5.31)	(	132.44)(	62.00)(	48.36)(	33.89)(
ROUTED TO	3	2.05	1	4482.	1826.	1247.	878.
	(	5.31)	(	126.91)(	51.70)(	35.32)(	24.87)(

D-23

SUMMARIES ATTACHED FROM OTHER COMPUTER RUNS

B

SUMMARY OF DAM SAFETY ANALYSIS

UNNAMED DAM

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1845.50	1845.50	1847.20
STORAGE	84.	84.	117.
OUTFLOW	0.	0.	150.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1847.94	.74	134.	1038.	6.50	40.50	0.00
.50	1847.65	.45	127.	492.	4.25	40.75	0.00
.40	1847.55	.35	125.	367.	3.50	40.75	0.00
.30	1847.40	.20	122.	224.	2.50	41.50	0.00

SUMMARIES ATTACHED FROM OTHER COMPUTER RUNS

D-24

B

SUMMARY OF DAM SAFETY ANALYSIS

LAKE -IN -THE - CLOUDS DAM

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1830.00	1830.00	1834.50
STORAGE	229.	229.	468.
OUTFLOW	0.	0.	1039.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1836.29	1.79	619.	4482.	7.50	41.50	0.00
.50	1835.30	.80	530.	1826.	4.50	42.50	0.00
.40	1834.91	.41	499.	1267.	3.00	43.00	0.00
.30	1834.02	0.00	436.	878.	0.00	43.25	0.00

SUMMARIES ATTACHED FROM OTHER COMPUTER RUNS

D-25

LITC BRANCH

A

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FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  01 APR 80
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    1          A1
    2          A2                          NATIONAL DAM INSPECTION PROGRAM
    3          A3                       LEAVITT BRANCH,BROADHEAD CREEK
                                          LAKE-IN-THE-CLOUDS DAM
    4          B    300       0       6       0       0       0       0       0      -4       0
    5          B1     <
    6          J      2       1       1
    7          J1     1  <------------------------------------------------------------  1% INPUT HYDROGRAPH (N-CARDS)
    8          K      0       3                                               1
    9          K1       COMBINED INFLOW TO LAKE-IN-THE-CLOUDS 50% PMF
   10          N     -1                2.05                    2.05                                    1
   11          N     16      16      15      15      15      15      15      15      15      15
   12          N     14      14      14      14      14      14      14      14      15      15
   13          N     16      16      17      18      19      20      21      22      23      23
   14          N     24      24      25      26      26      27      27      27      28      28
   15          N     29      29      30      30      30      31      31      32      32      32
   16          N     33      33      34      34      34      34      34      34      34      34
   17          N     35      35      35      35      35      35      35      35      36      36
   18          N     36      37      37      37      38      38      38      38      39      39
   19          N     40      50      52      55      60      65      69      70      74      78
   20          N     80      82      83      85      88      90      92      95      96      99
   21          N    101     103     105     108     110     113     115     117     119     121
   22          N    123     125     128     130     132     134     135     136     138     139
   23          N    140     141     142     145     146     147     148     149     150     151
   24          N    155     160     165     170     180     185     190     195     200     210
   25          N    215     250     280     305     325     340     365     400     430     450
   26          N    475     505     530     560     585     610     635     655     695     725
   27          N    760     785     825     855     895     915     960     995    1050    1100
   28          N   1155    1250    1325    1425    1565    1730    1810    1910    2100    2150
   29          N   2180    2185    2189    2189    2175    2145    2130    2100    2075    2055
   30          N   2025    1995    1965    1935    1905    1875    1850    1815    1780    1735
   31          N   1670    1617    1564    1511    1458    1405    1352    1299    1246    1193
   32          N   1140    1108    1076    1044    1012     980     948     916     884     852
   33          N    820     797     774     751     728     705     682     659     636     613
   34          N    590     575     560     545     530     515     500     485     470     455
   35          N    440     430     419     409     398     388     377     367     356     346
   36          N    335     328     321     314     307     300     293     286     279     272
   37          N    265     260     254     249     243     238     232     227     221     216
   38          N    210     206     201     197     192     188     183     179     174     170
   39          N    165     162     159     156     153     150     147     144     141     138
   40          N    135     133     131     129     127     125     123     121     119     117
   41          K      1       3                                               1
   42          K1       ROUTE THROUGH LAKE-IN-THE-CLOUDS
   43          Y                                1       1
   44          Y1     1                                                -1830      -1
   45          Y4  1830  1830.5  1831.0  1831.5  1832.0  1833.0  1834.0  1834.5  1835.0  1840.0
   46          Y5     0      38     109     200     308     565     870    1039    1134    1807
   47          SA   .01   23.06   44.34   53.26     163
   48          SE1820.2    1824    1830    1833    1840
   49          SS  1830
   50          SD1834.5
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FROM MULTI-RATIO ANALYSIS COMBINED INFLOW TO LAKE-IN-THE-CLOUDS FOR THE 0.5 PMF, USING THE CRITICAL 30 HOUR PERIOD.

D-26

A

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51    SL      1        80       180       460       515       525       560       600
52    SV1834.5    1834.6    1834.7    1834.9    1835.2    1835.3    1835.6    1837.4
53    SB   80         1    1820.2        .1      1830    1840.0
54    SB   80         1    1820.2        .1      1830    1834.8
55    K     1         4                                             1
56    K1        STREAM SECTION
57    Y                                  1         1
58    Y1    1                                                      -1
59    Y6  .09       .07       .09      1790      1820      2600     .011
60    Y7    0      1840        50      1820       100      1800      320      1790       480      1790
61    Y7  550      1800       700      1820      1200      1840
62    K     1         5                                             1
63    K1        STREAM SECTION
64    Y                                  1         1
65    Y1    1                                                      -1
66    Y6  .09       .07       .09      1749      1780      4400    .0042
67    Y7    0      1800        80      1780       180      1760      310      1749       850      1749
68    Y7  980      1760      1100      1780      1330      1800
69    K     1         6                                             1
70    K1        STREAM SECTION
71    Y                                  1         1
72    Y1    1                                                      -1
73    Y6  .09       .07       .09      1705      1730      4400      .01
74    Y7    0      1760       100      1740       210      1720      480      1705       590      1705
75    Y7  890      1720      1000      1740      1100      1760
76    K     1         7                                             1
77    K1        STREAM SECTION
78    Y                                  1         1
79    Y1    1                                                      -1
80    Y6  .09       .07       .09      1553      1600      3200     .025
81    Y7    0      1700       400      1600       425      1560      450      1553       480      1553
82    Y7  550      1560       600      1580       670      1600
83    K     1         8                                             1
84    K1        STREAM SECTION
85    Y                                  1         1
86    Y1    1                                                      -1
87    Y6  .09       .07       .09      1529      1550      2800    .0125
88    Y7    0      1580       200      1560       350      1540      620      1529       750      1529
89    Y7  950      1540      1050      1560      1100      1580
90    K     1         9                                             1
91    K1        SKYTOP DAM
92    Y                                  1         1
93    Y1    1                                                   -1520        -1
94    Y4 1520      1521      1522      1523      1524      1525      1528      1530
95    Y5    0       310       877      1610      2665      3153      4296      5715
96    SS    0       629      1037      2659
97    SE 1506      1520      1525      1540
98    SS 1520
99    SD1524.8       2.5       1.5       500
100   K    99
```

D-27

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00
HYDROGRAPH AT	3	2.05	1	2189.
		(5.31)		(61.99)
			2	2189.
				(61.99)
ROUTED TO	3	2.05	1	1826.
		(5.31)		(51.72)
			2	16160.
				(457.59)
ROUTED TO	4	2.05	1	1820.
		(5.31)		(51.55)
			2	12222.
				(346.10)
ROUTED TO	5	2.05	1	1691.
		(5.31)		(47.87)
			2	7790.
				(220.58)
ROUTED TO	6	2.05	1	1676.
		(5.31)		(47.46)
			2	6848.
				(193.91)
ROUTED TO	7	2.05	1	1673.
		(5.31)		(47.37)
			2	6845.
				(193.84)
ROUTED TO	8	2.05	1	1668.
		(5.31)		(47.22)
			2	6544.
				(185.32)
ROUTED TO	9	2.05	1	1358.
		(5.31)		(38.46)
			2	3264.
				(92.41)

A

SUMMARY OF DAM SAFETY ANALYSIS

LAKE-IN-THE-CLOUDS

PLAN 1 ..... INITIAL VALUE SPILLWAY CREST TOP OF DAM

ELEVATION	1830.00	1830.00	1834.50
STORAGE	229.	229.	468.
OUTFLOW	0.	0.	1039.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
~~1.00~~ .50	1835.30	.80	530.	1826.	4.40	19.80	0.00

PLAN 2 ..... INITIAL VALUE SPILLWAY CREST TOP OF DAM

ELEVATION	1830.00	1830.00	1834.50
STORAGE	229.	229.	468.
OUTFLOW	0.	0.	1039.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
~~1.00~~ .50	1834.87	.37	496.	16160.	.40	18.70	18.60

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	1820.	1792.4	19.90

PLAN 2 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	12222.	1797.0	18.80

PLAN 1 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	1691.	1750.6	20.60

PLAN 2 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	7790.	1753.0	19.10

PLAN 1 STATION 6

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	1676.	1707.8	20.80

PLAN 2 STATION 6

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	6848.	1710.8	19.30

PLAN 1 STATION 7

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	1673.	1557.0	20.90

PLAN 2 STATION 7

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	6845.	1560.9	19.40

PLAN 1 STATION 8

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	1668.	1531.4	21.10

PLAN 2 STATION 8

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	6544.	1534.0	19.50

SUMMARY OF DAM SAFETY ANALYSIS

SKYTOP DAM

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1520.00	1520.00	1524.80
STORAGE	629.	629.	1021.
OUTFLOW	0.	0.	3055.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
~~1.00~~ .50	1522.66	0.00	846.	1358.	0.00	22.60	0.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1520.00	1520.00	1524.80
STORAGE	629.	629.	1021.
OUTFLOW	0.	0.	3055.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
~~1.00~~ .50	1525.00	.20	1037.	3264.	.80	20.50	0.00

GANNETT FLEMING CORDDRY AND CARPENTER, INC. HARRISBURG, PA.

SUBJECT _____ FILE NO. _____

_____ SHEET NO. ____ OF ____ SHEETS

FOR _____

COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

Summary of Pertinent Results

PMF RAINFALL = 25.11"

	PMF	0.5 PMF
RUNOFF (INCHES)	20.65	11.10
LAKE-IN-THE-CLOUDS		
PEAK INFLOW (CFS)	4,677	2,189
PEAK OUTFLOW (CFS)	4,482	1,826
DEPTH OF OVERTOPPING (FT)	1.79	.80
DURATION OF OVERTOPPING (HRS)	7.50	4.50

BREACH ANALYSIS: DATA AT SKYTOP DAM

50% PMF ONLY

ALL DAMS UPSTREAM OF LAKE-IN-THE-CLOUDS ARE ASSUMED TO REMAIN INTACT

FREEBOARD (ASSUMING LAKE-IN-THE-CLOUDS DOES NOT FAIL) (FT) 2.14

DEPTH AND DURATION OF OVERTOPPING ASSUMING LAKE-IN-THE-CLOUDS FAILS .20FT FOR 0.80 HRS.

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT _____ FILE NO. _____
SHEET NO. ____ OF ____ SHEETS
FOR _____
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

NOTE:

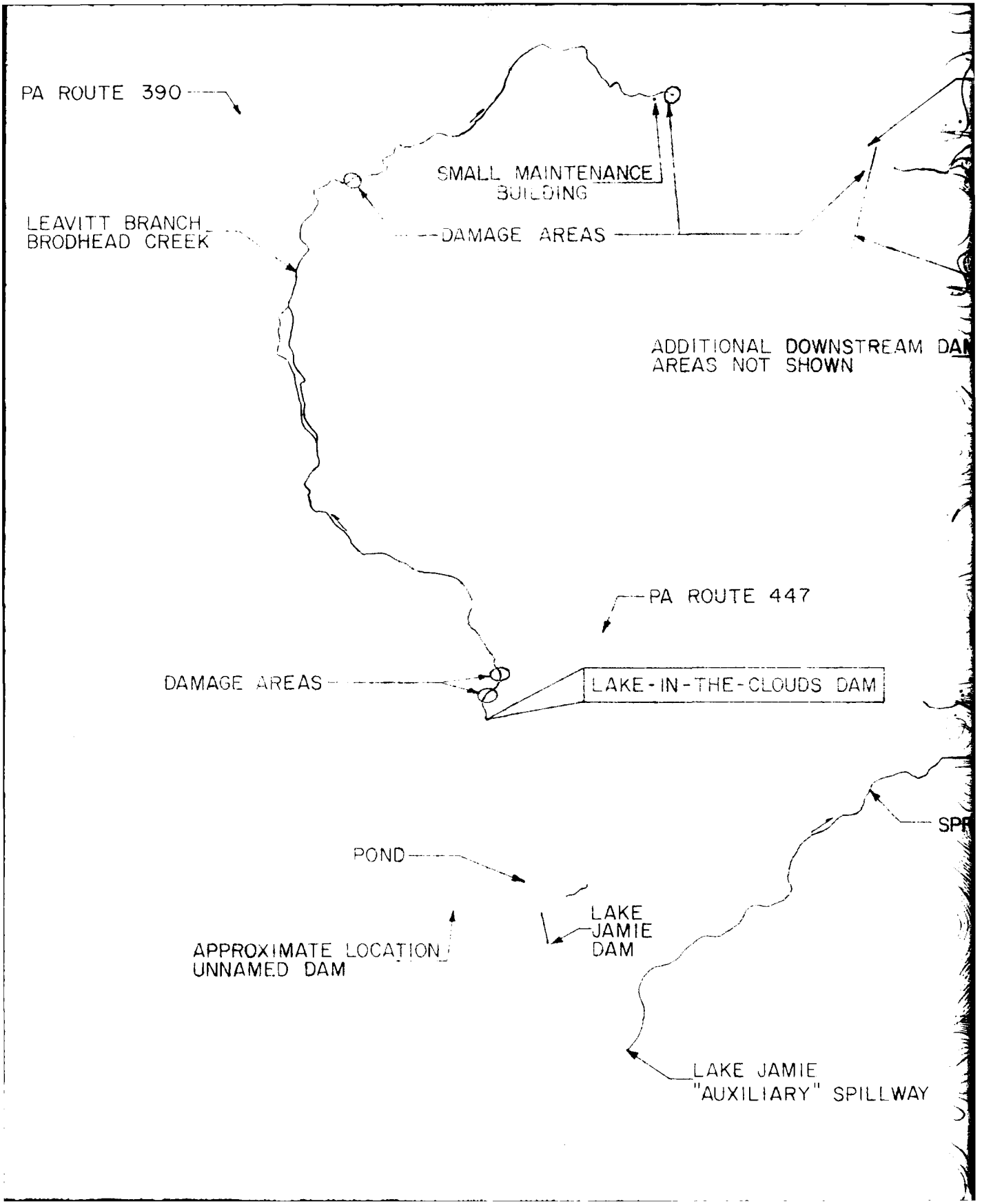
In the Phase I Report for Skytop Dam, Lake-In-The-Clouds Dam was computed as passing 61% of the PMF. The reasons for the difference between Lake-In-The-Clouds in the Skytop Dam Report (61% of PMF) and Lake-In-The-Clouds in this Report (35% of PMF) are listed below:

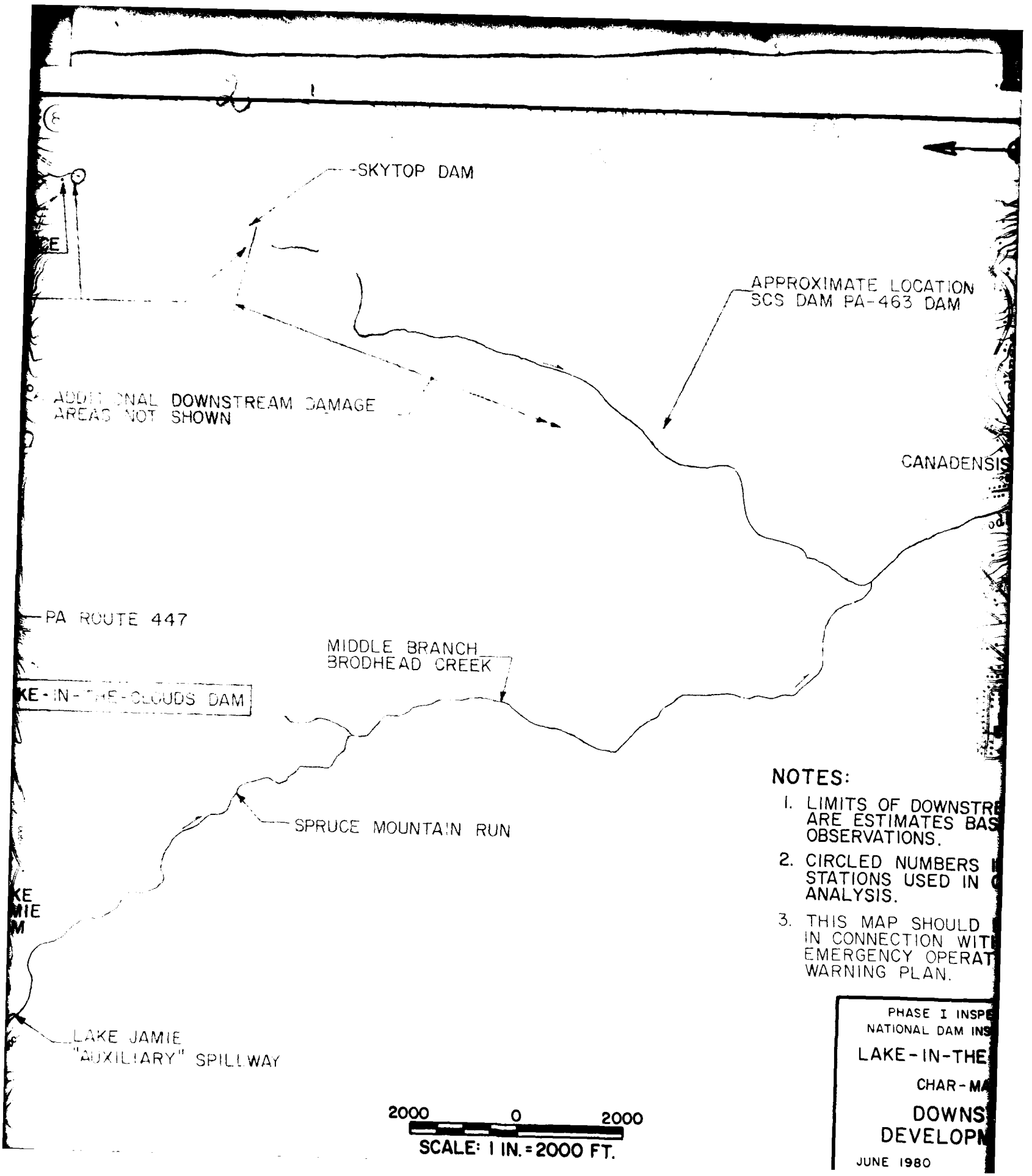
Data for Lake-In-The Clouds

Skytop Dam Report		This Report
1.75	Drainage Area (sq. mi.)	2.05
1835.0	Top of Dam Elev.	1834.5
Not included	Effects of Spillway Bridge	Included
615 ac-ft(1)	Storage Data	468 ac-ft(2)
Not included	Effects of Lake Jamie Dam and Unnamed Dam	Included

(1) Spillway crest to top of dam
(2) Entire impoundment.

6813

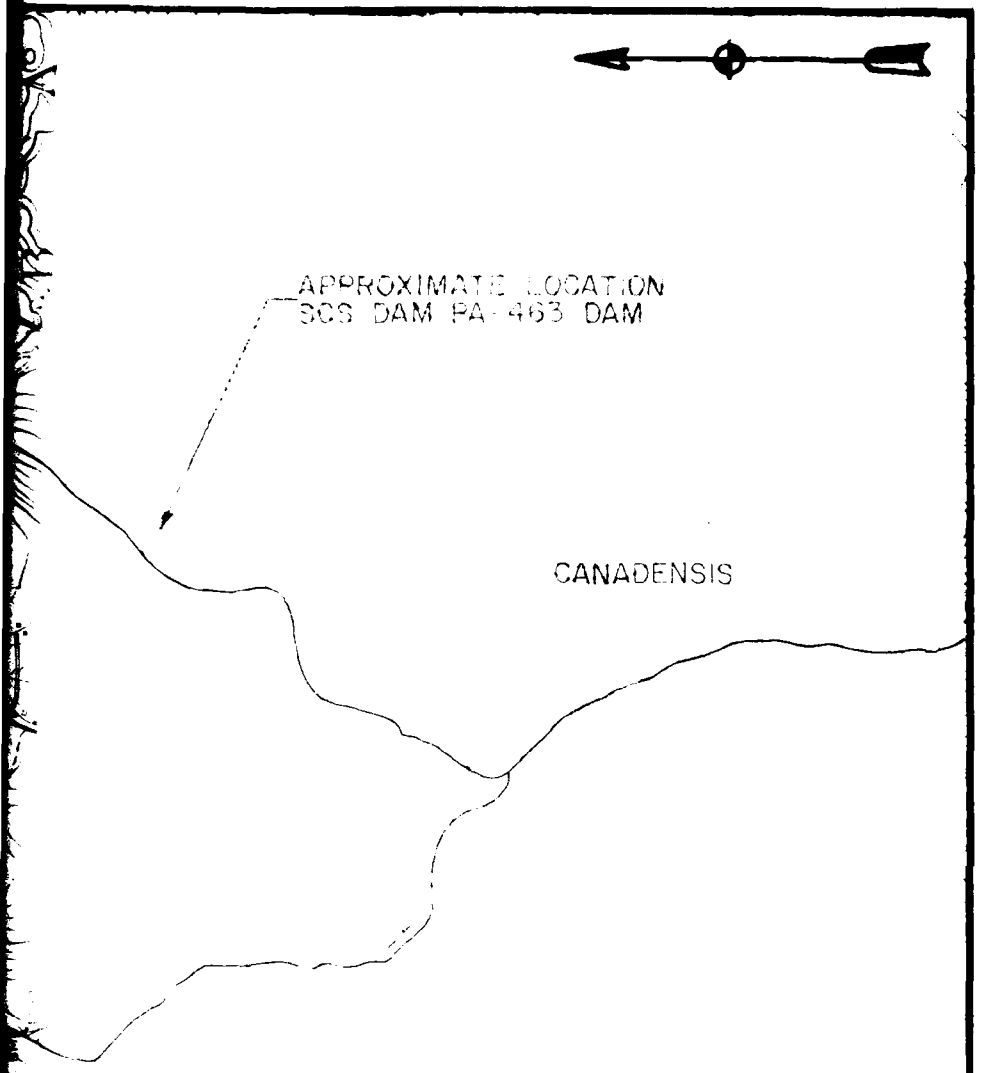

PA ROUTE 390
SMALL MAINTENANCE BUILDING
LEAVITT BRANCH BRODHEAD CREEK
DAMAGE AREAS
ADDITIONAL DOWNSTREAM DAM AREAS NOT SHOWN
PA ROUTE 447
DAMAGE AREAS
LAKE-IN-THE-CLOUDS DAM
SPR
POND
LAKE JAMIE DAM
APPROXIMATE LOCATION UNNAMED DAM
LAKE JAMIE "AUXILIARY" SPILLWAY



NOTES:

1. LIMITS OF DOWNSTRE
ARE ESTIMATES BAS
OBSERVATIONS.
2. CIRCLED NUMBERS
STATIONS USED IN
ANALYSIS.
3. THIS MAP SHOULD
IN CONNECTION WIT
EMERGENCY OPERAT
WARNING PLAN.

PHASE I INSPE
NATIONAL DAM INS
LAKE-IN-THE
CHAR-MA
DOWNS
DEVELOPM
JUNE 1980



3

NOTES:

1. LIMITS OF DOWNSTREAM FLOODING ARE ESTIMATES BASED ON VISUAL OBSERVATIONS.
2. CIRCLED NUMBERS INDICATE STATIONS USED IN COMPUTER ANALYSIS.
3. THIS MAP SHOULD NOT BE USED IN CONNECTION WITH THE EMERGENCY OPERATION AND WARNING PLAN.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE-IN-THE-CLOUDS DAM

CHAR-MART, INC.

DOWNSTREAM DEVELOPMENT MAP

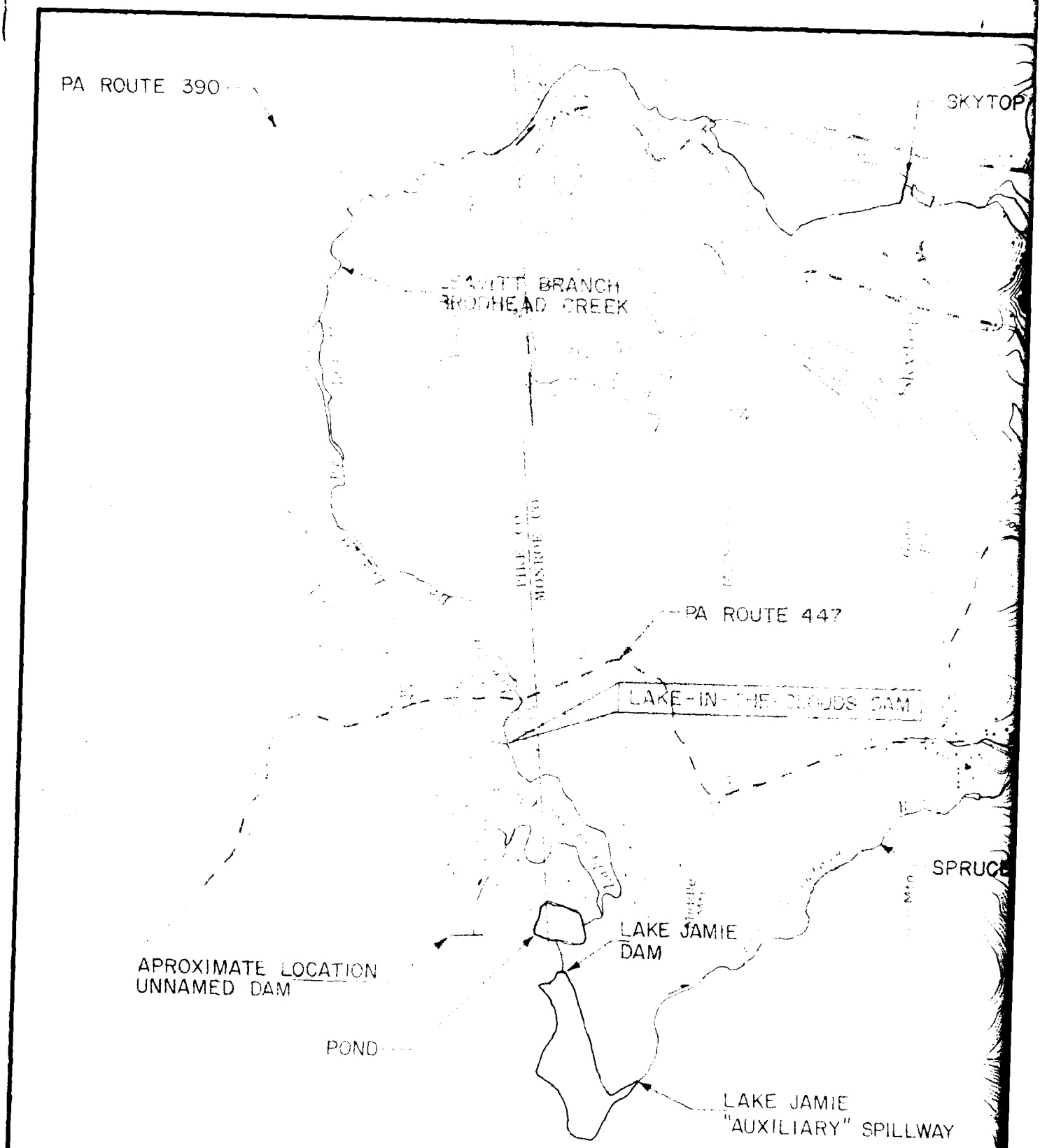
JUNE 1980 EXHIBIT D-1

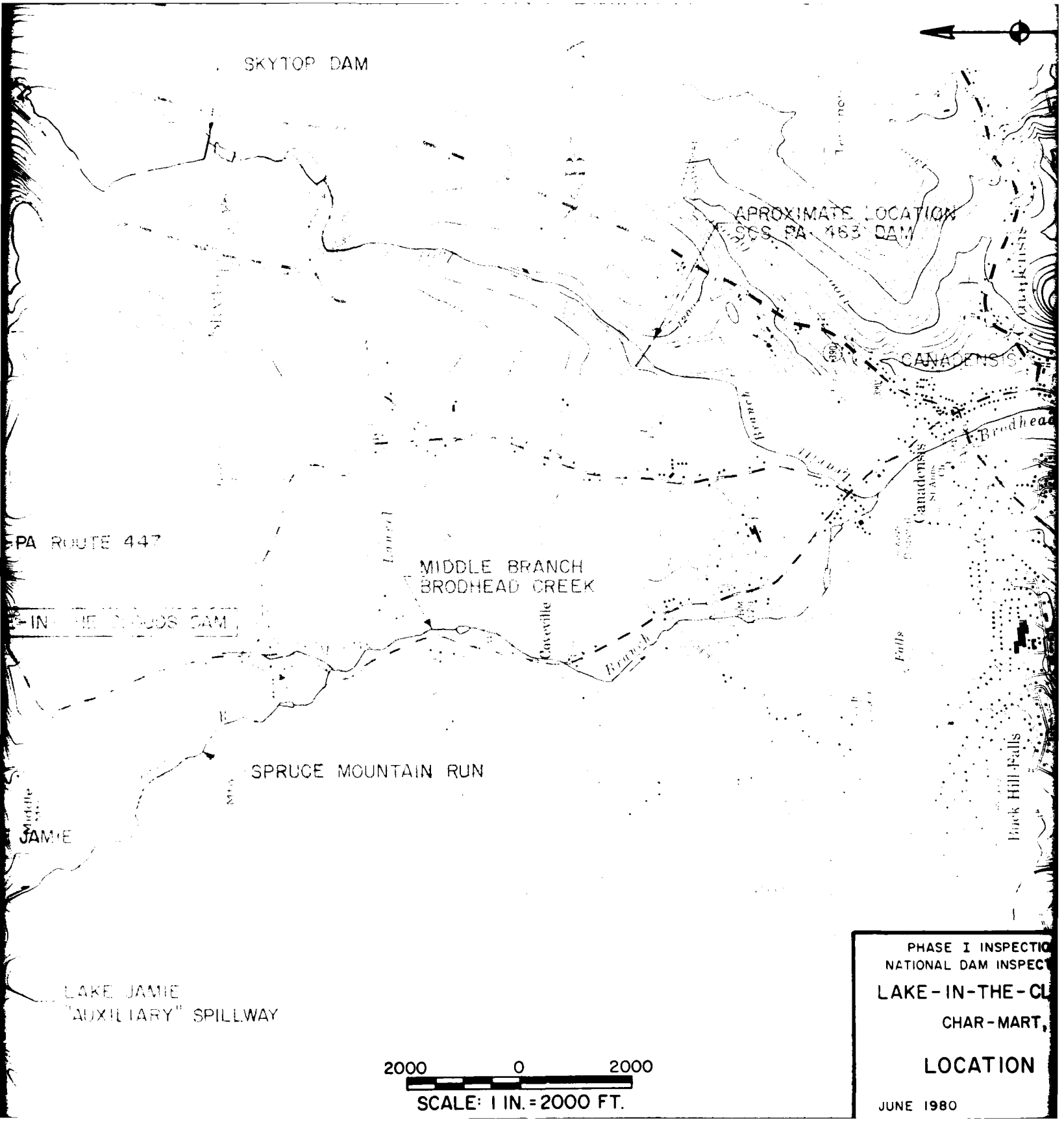
2000

00 FT.

APPENDIX E

PLATES


PA ROUTE 390
SKYTOP
BRANCH
BROADHEAD CREEK
PA ROUTE 447
LAKE-IN-THE-CLOUDS DAM
SPRUCE
LAKE JAMIE
DAM
APROXIMATE LOCATION
UNNAMED DAM
POND
LAKE JAMIE
"AUXILIARY" SPILLWAY

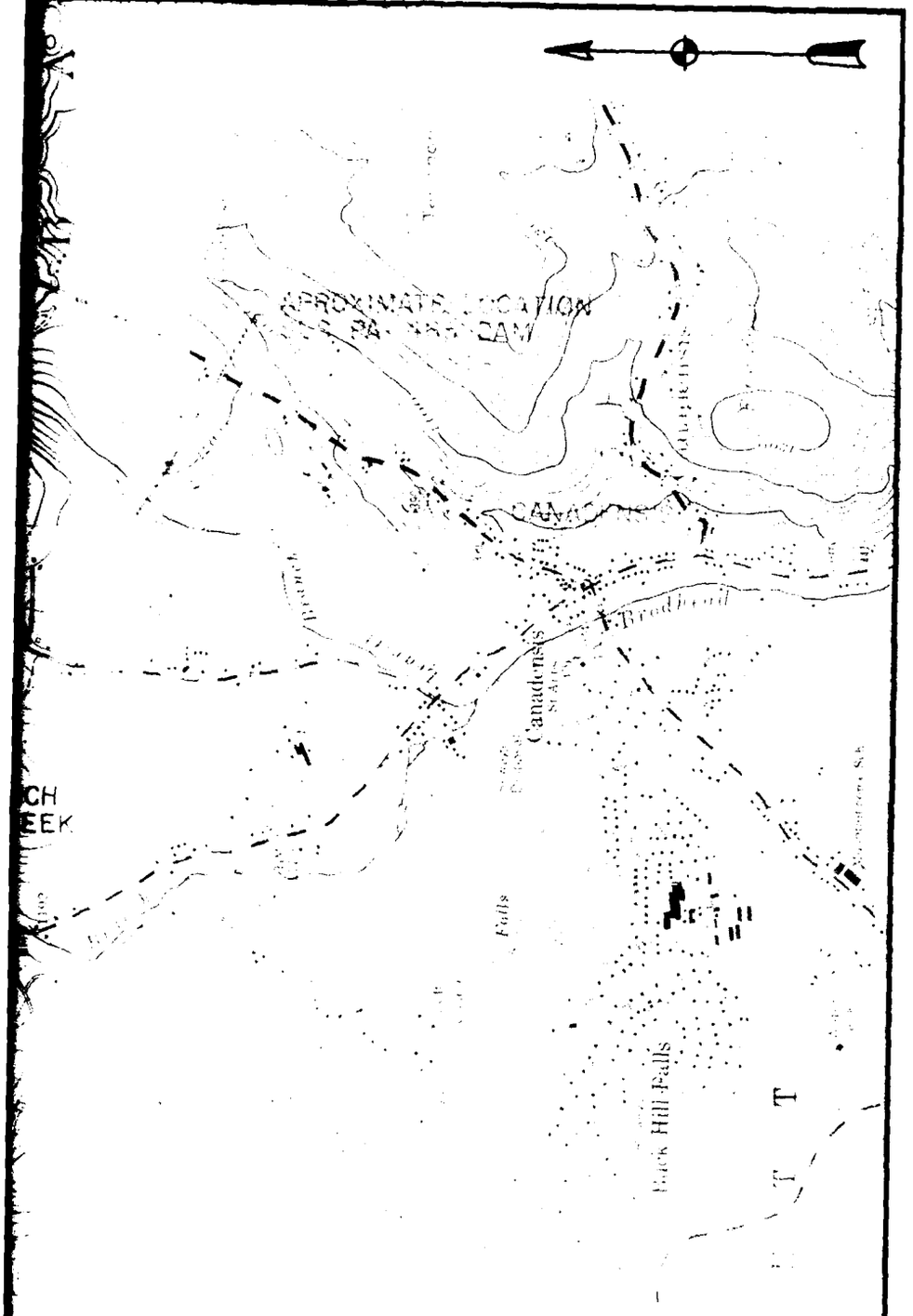


PHASE I INSPECTIO
NATIONAL DAM INSPECT

LAKE-IN-THE-CL
CHAR-MART,

LOCATION

JUNE 1980



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE-IN-THE-CLOUDS DAM

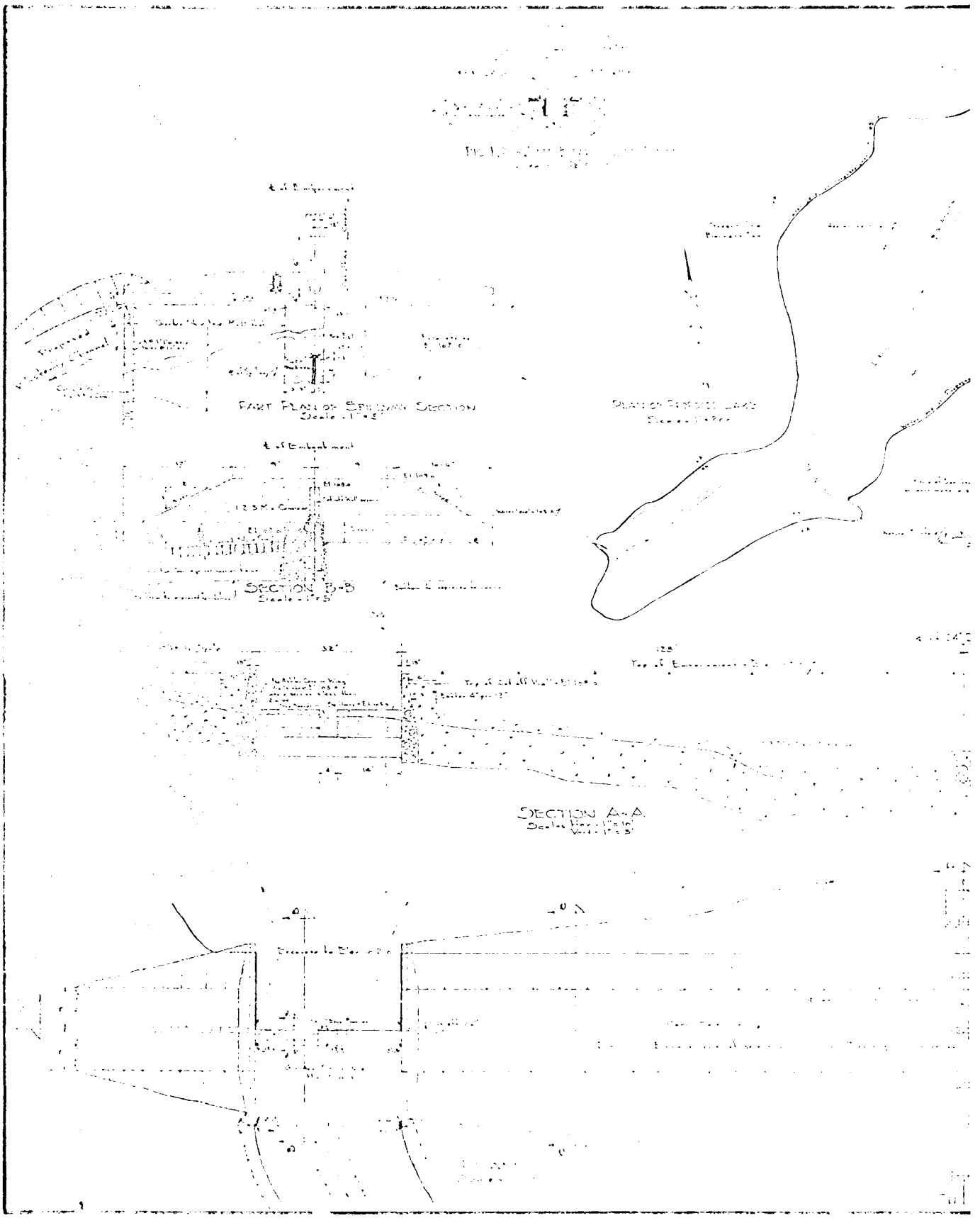
CHAR-MART, INC.

LOCATION MAP

JUNE 1980 PLATE E-1

2000

00 FT.


PART PLAN OF SPILLWAY SECTION
SECTION B-B
SECTION A-A

AD-A087 937 GANNETT FLEMING CORDDRY AND CARPENTER INC HARRISBURG PA F/G 13/13
NATIONAL DAM INSPECTION PROGRAM. LAKE-IN-THE-CLOUDS DAM. (NDI I--ETC(U)
JUN 80 F FUTCHKO DACW31-80-C-0017

UNCLASSIFIED NL

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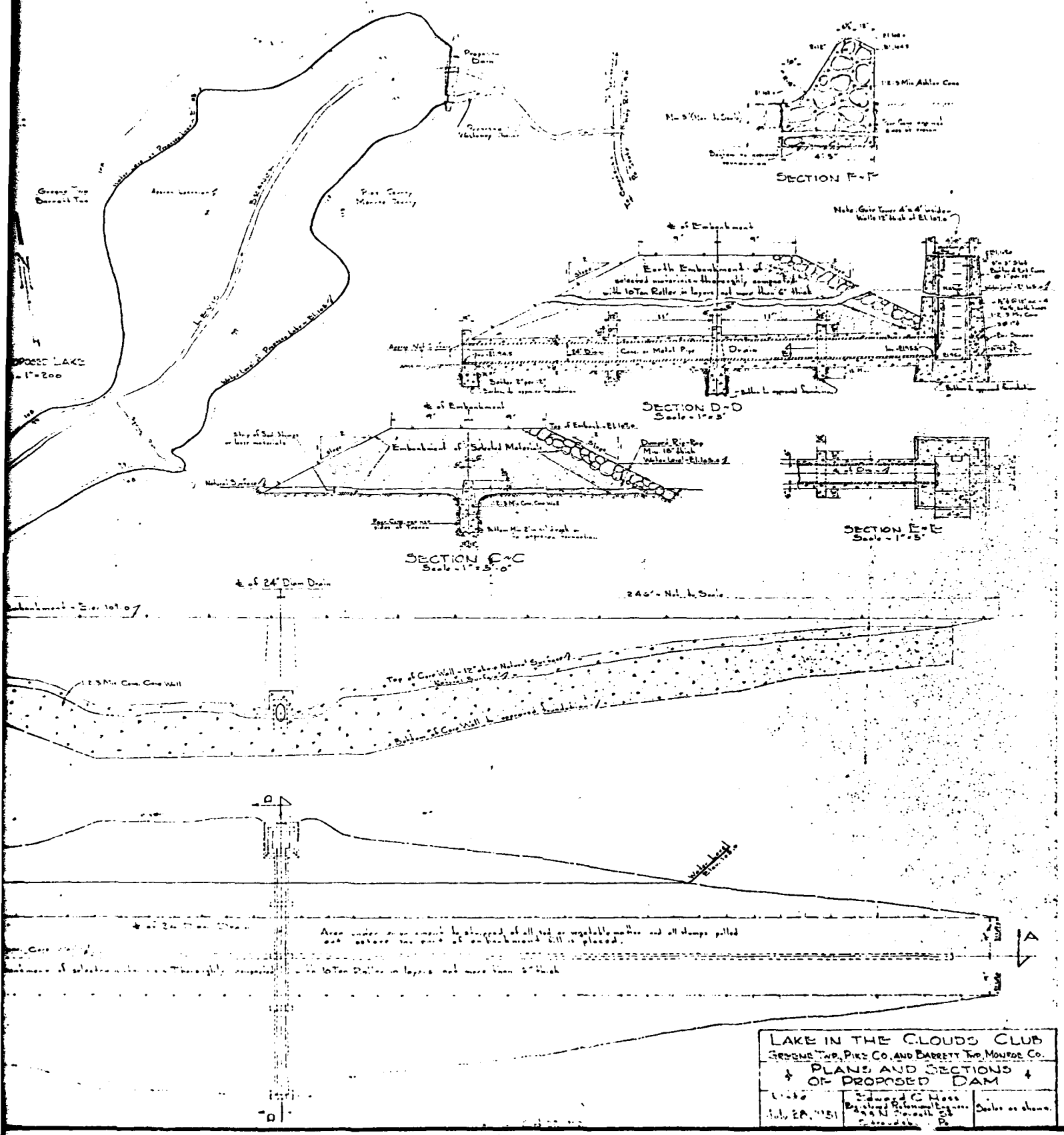


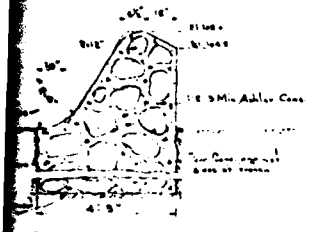
LAKE IN THE CLOUDS CLUB

GREENE TWP, PIKE CO. AND BARRETT TWP, MONROE CO.

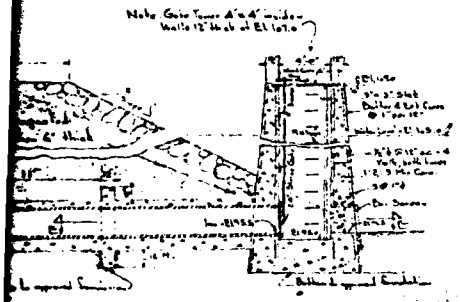
PLANS AND SECTIONS
OF PROPOSED DAM

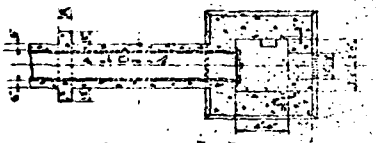
Date: July 28, 1951	Edward C. Hess, Registered Professional Engineer, 244 N. Prescott St., Scranton, Pa.	Scales as shown

3

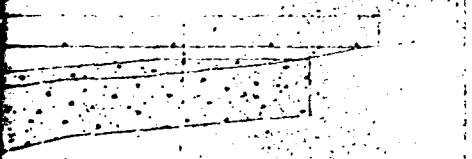


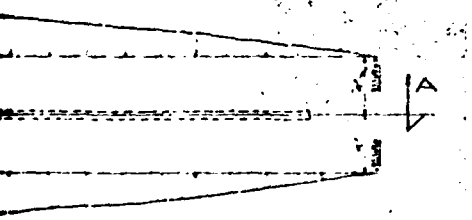
SECTION F-F





SECTION E-E
Scale - 1"=5'





LAKE IN THE CLOUDS C[illegible]
[illegible] TWP., PIKE CO., AND BARRETT TWP., MON[illegible]
PLANS AND SECTIONS OF PROPOSED DAM
[illegible] | Edward C. Hess, Registered Professional Engineer, [illegible] | Scales as shown

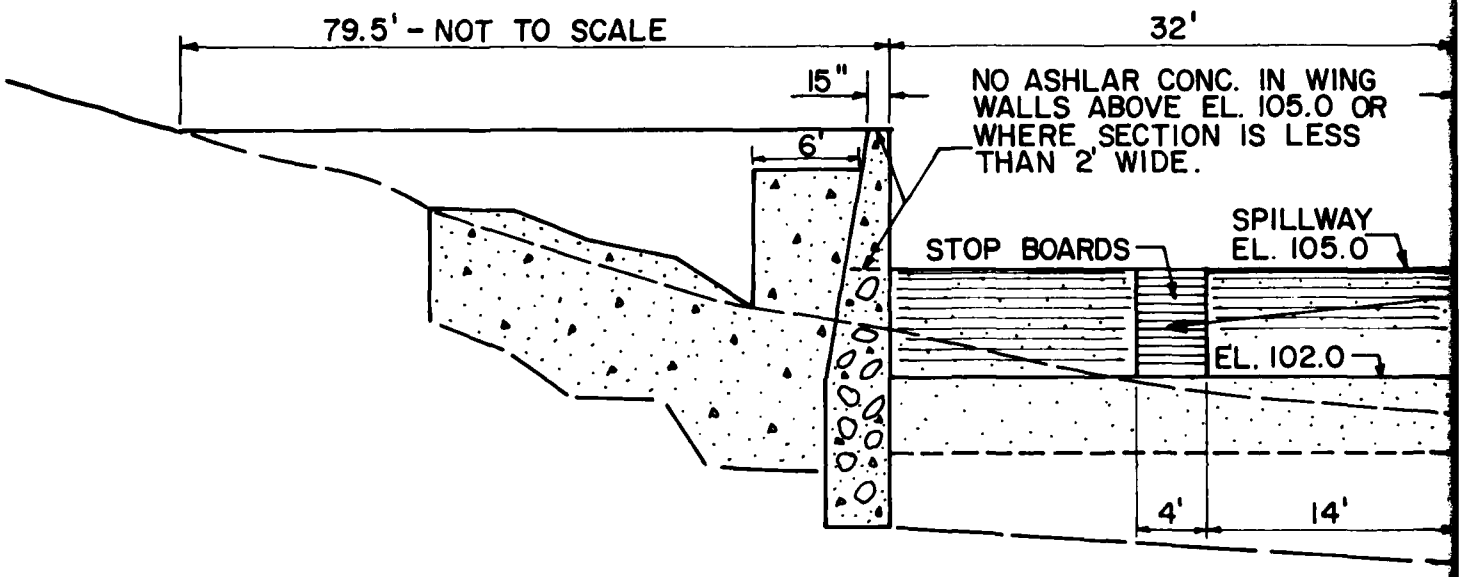
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE-IN-THE-CLOUDS DAM

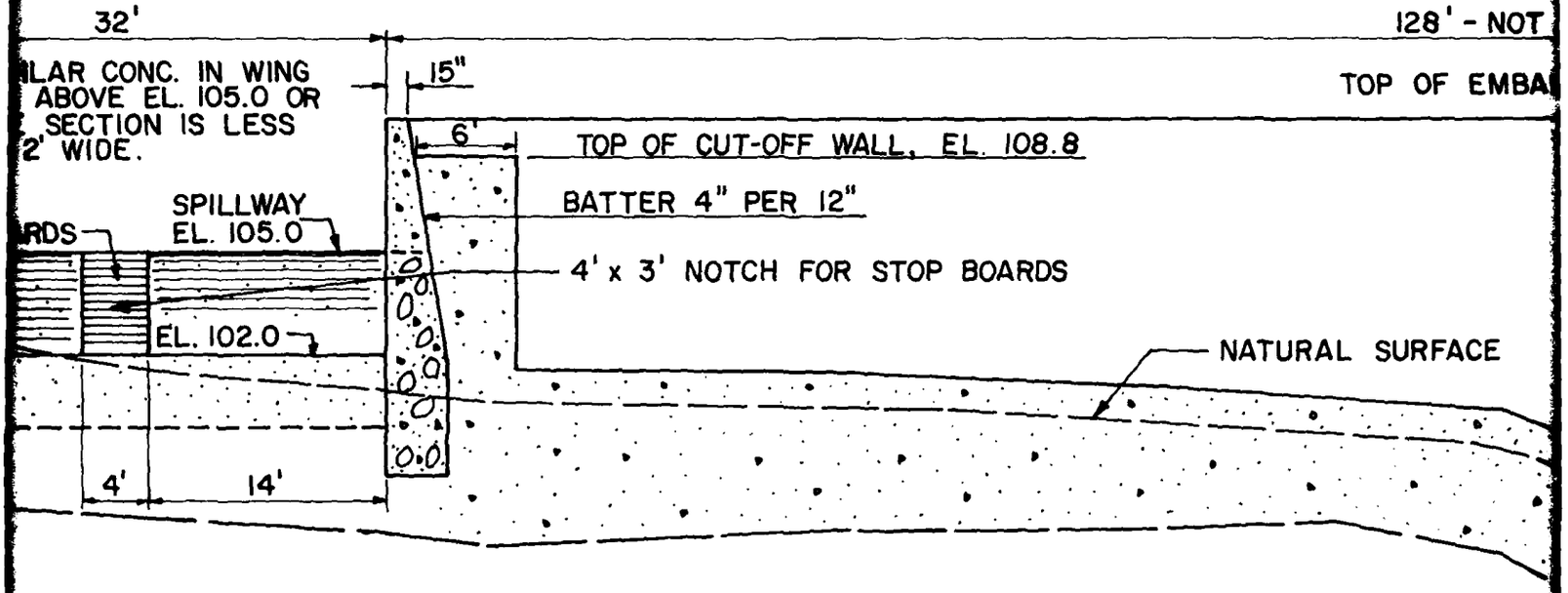
CHAR-MART, INC.

PLAN, PROFILE AND SECTIONS

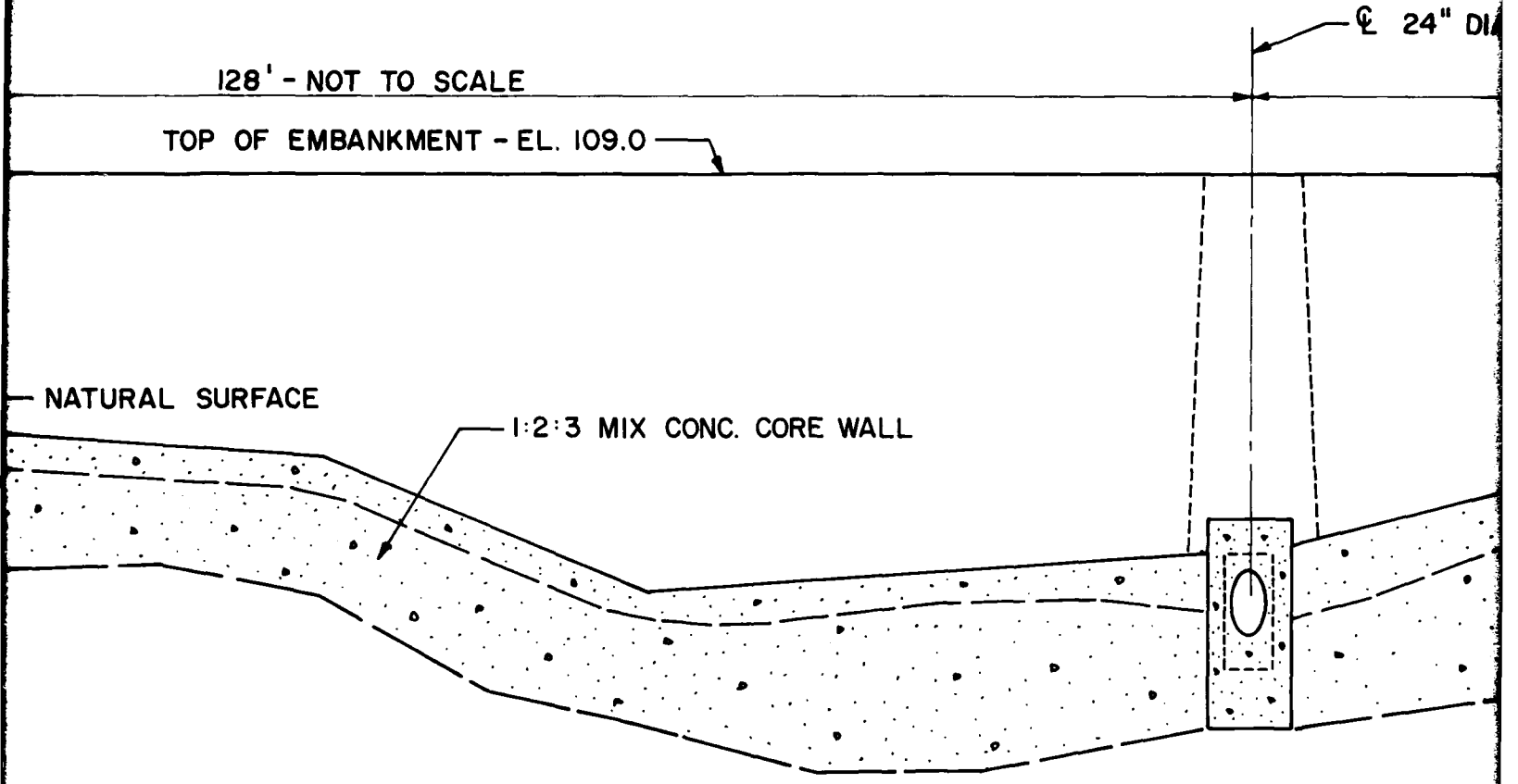
JUNE 1980 PLATE E-2


79.5' - NOT TO SCALE
32'
15"
NO ASHLAR CONC. IN WING WALLS ABOVE EL. 105.0 OR WHERE SECTION IS LESS THAN 2' WIDE.
6'
SPILLWAY EL. 105.0
STOP BOARDS
EL. 102.0
4'
14'

2


32'
128' - NOT
LAR CONC. IN WING
ABOVE EL. 105.0 OR
SECTION IS LESS
2' WIDE.
15"
TOP OF EMBA
6'
TOP OF CUT-OFF WALL, EL. 108.8
BATTER 4" PER 12"
SPILLWAY
EL. 105.0
RDS
4' x 3' NOTCH FOR STOP BOARDS
EL. 102.0
NATURAL SURFACE
4'
14'

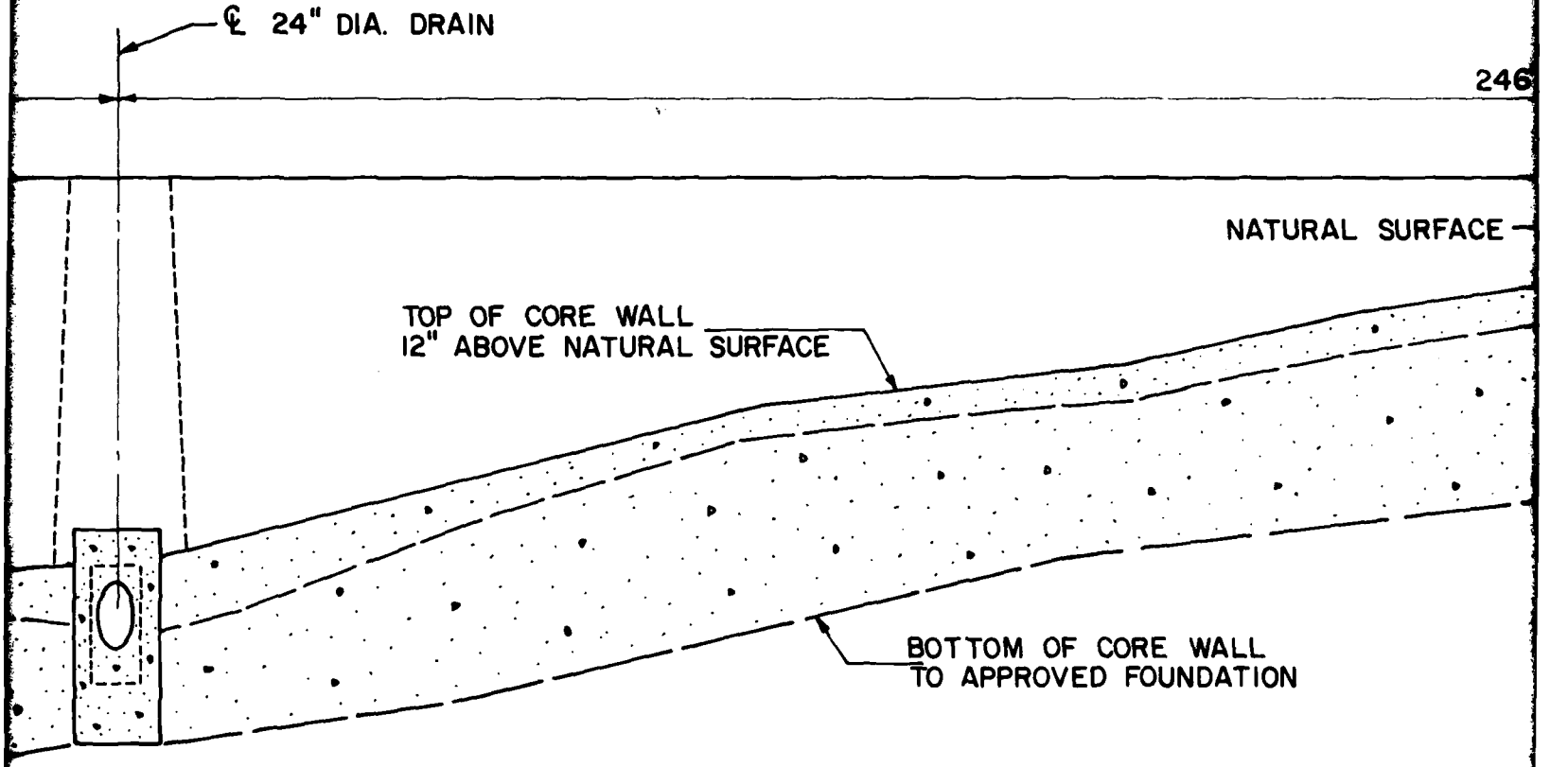
3



SECTION A-A

SCALES: HORZ: 1" = 10'
VERT: 1" = 5'

4

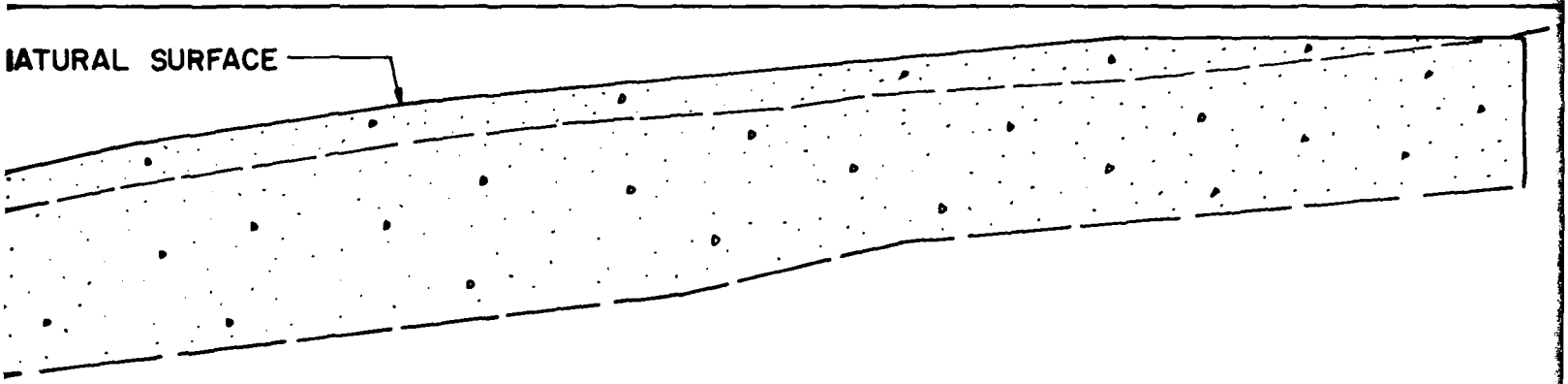


NOTE

TRACED FROM PRINT PROVIDE
PRINT IS IDENTICAL TO PLATE
NOTED AS: REVISED FEB. 3,

5

246' - NOT TO SCALE



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OM PRINT PROVIDED BY E. C. HESS ASSOCIATES.
ENTICAL TO PLATE E-2 EXCEPT SECTION A-A
REVISED FEB. 3, 1965 AS-BUILT.

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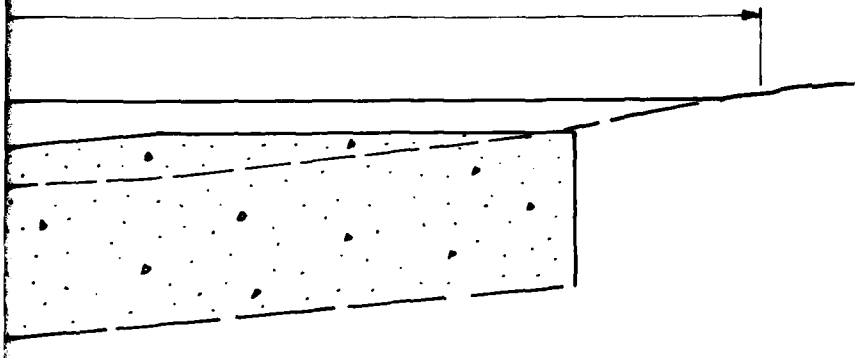


PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE-IN-THE-CLOUDS DAM

CHAR-MART, INC.

AS BUILT PROFILE

JUNE 1980 PLATE E-3

APPENDIX F

GEOLOGY

LAKE-IN-THE-CLOUDS DAM

APPENDIX F

GEOLOGY

Lake-In-The-Clouds Dam is located in Pike County within the Appalachian Plateau Physiographic Province. The most pronounced topographic feature in the area is Camelback Mountain, which is part of the Pocono Plateau Escarpment. The escarpment has a well-defined southwestward trend from Camelback Mountain, but is irregular between Camelback Mountain and Mt. Pocono, which lies to the north. Streams east of the escarpment drain directly to the Delaware River, while those to the west drain to the Lehigh River.

The Pocono Plateau Section lies to the west of the escarpment. This area is relatively flat, with local relief seldom exceeding 100 feet. The topography has been greatly influenced by continental glaciation. Many features were created by deposition of glacial materials. The entire plateau lacks well-developed drainage.

East of the escarpment is the Glaciated Low Plateaus Section of the province. This area is characterized by pre-glacial erosional topography with locally-thick glacial deposits. Local relief is generally 100 to 300 feet.

Bedrock units of the sections described above are the lithified sediments of offshore marine, marginal marine, deltaic and fluvial environments associated with the Devonian Period. These units include siltstones of the Mahantango Formation, siltstones and shales of the Trimmers Rock Formation, and seven mapped members of the Catskill Formation. These members include sandstones, siltstones, and shales of the Towamensing member; sandstone, siltstone and shale of the Walcksville Member; sandstones, siltstones and shale of the Beaverdam Run Member; sandstone and shale in the Long Run Member; sandstones and conglomerates in the Packerton Member; sandstones and some conglomerates in the Poplar Gap Member; and sandstones and conglomerates in the Duncannon Member.

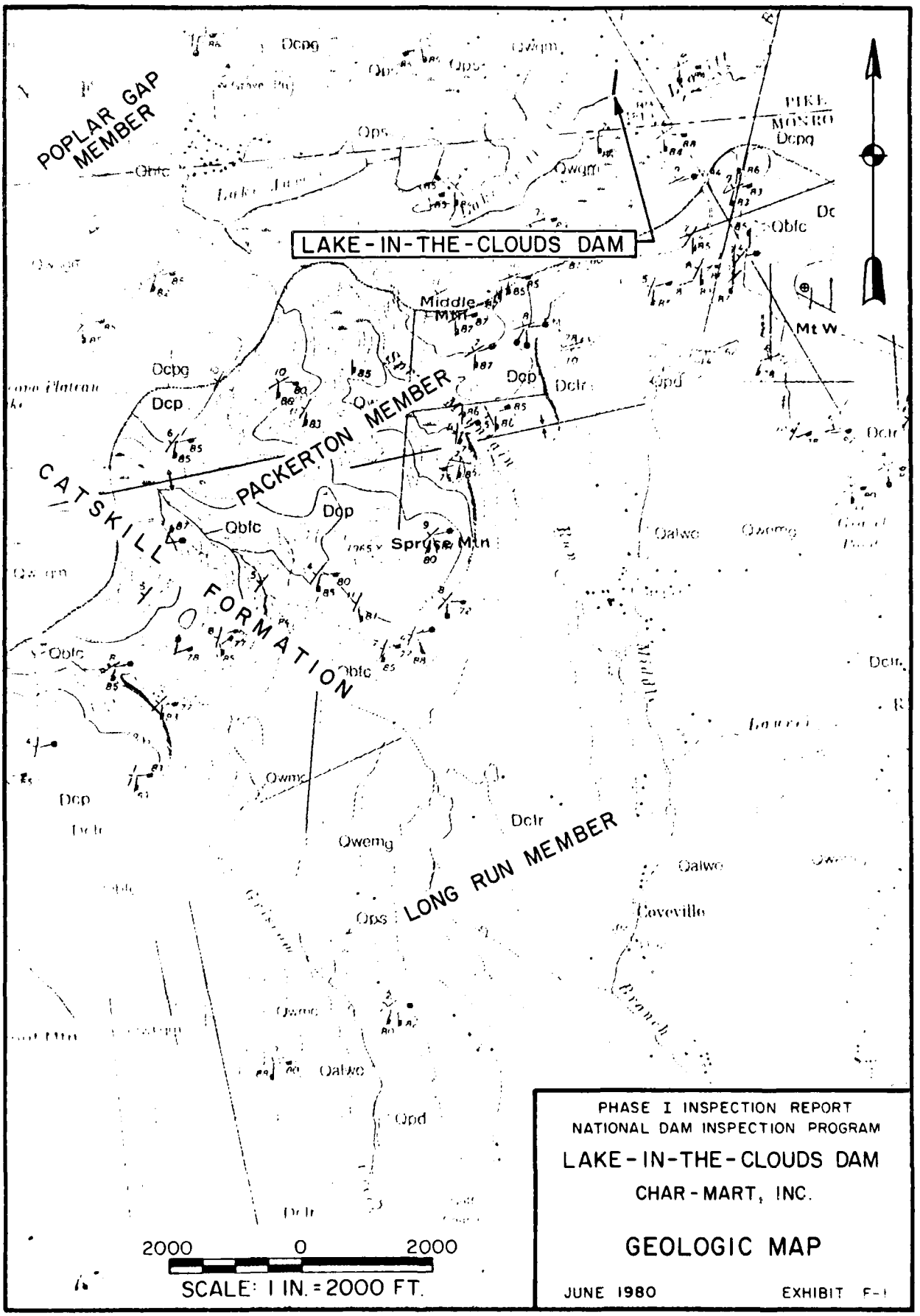
Lake-In-The-Clouds Dam is underlain by the Poplar Gap Member of the Catskill Formation. The Poplar Gap Member is predominantly a gray sandstone and conglomeratic sandstone with interbedded siltstones and shales. Sandstones present are thick-bedded, fine- to coarse-grained and exhibit very low primary porosity due to a clay and silica matrix. Effective porosity results from fractures and parting planes.

Conglomeratic sandstone occurs primarily as concentrates of sub-round to round quartz pebbles. The siltstones and shales at the site are thin-bedded and also have low porosity.

The rocks are well-indurated and generally are not susceptible to slope failure; however, the presence of well-developed bedding and joint planes will result in some rockfall from vertical and high-angle cut slopes.

Bedrock is entirely overlain by glacial till of Late Wisconsin Age. This till is an unsorted mixture of clay, silt, sand, and gravel. It is moderately cohesive and is generally derived locally from the sandstones of the Catskill Formation. Thickness of the till varies from 5 to 75 feet.

The available data indicate that the right end of the dam, including the spillway, are founded on bedrock. The remainder of the dam is apparently founded on clay.



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NATIONAL DAM INSPECTION PROGRAM

LAKE-IN-THE-CLOUDS DAM

CHAR-MART, INC.

GEOLOGIC MAP

JUNE 1980 EXHIBIT E-1